Pathway to Sustainability Leadership by MIT

Incubation, Transformation, and Mobilization

Campus Sustainability Task Force, 2017

CONTENTS

PREFACE

In 2015, MIT Provost Martin Schmidt and Executive Vice President Israel Ruiz convened the Campus Sustainability Task Force with a charge to "shape the vision and plan of action for campus sustainability at MIT." The task force was to engage the MIT community and to integrate "the campus sustainability perspectives of the MIT Office of Sustainability, MIT Energy Initiative, MIT Environmental Solutions Initiative, and build upon the MIT Plan for Climate Action." Its primary activities were to 1) "initiate a process to agree upon a shared and actionable vision for campus sustainability at MIT through 2025, and design a roadmap for achieving this vision," 2) "facilitate collaborative activities with faculty, students, and staff across MIT's departments, laboratories, and centers to advance the overarching goal of using the campus as a living lab for sustainability," and 3) "review outcomes and recommendations from the Sustainability Working Groups coordinated by the Office of Sustainability." In response to this charge, we have drafted this Pathway to Sustainability Leadership by MIT.

INTRODUCTION

The world faces a profound challenge: the current organization of human societies and economies is environmentally unsustainable (Hoekstra and Wiedmann 2014; Steffen et al. 2015). The planet simply cannot support the current population growth rate and ensuing natural-resource demands and environmental degradation that result from ever-increasing impacts of human activity.

Sustainability, as framed by the need to promote health and wellbeing for a growing world population while reducing our global footprint to within Earth's capacity to sustain us, is a defining challenge for the world's citizens in the 21st century, and for MIT.

Leadership in sustainability through teaching and research is a natural extension of MIT's mission:

> *The mission of MIT is to advance knowledge and educate students in science, technology, and other areas of scholarship that will best serve the nation and the world in the 21st century.*
>
> *The Institute is committed to generating, disseminating, and preserving knowledge, and to working with others to bring this knowledge to bear on the world's great challenges. MIT is dedicated to providing its students with an education that combines rigorous academic study and the excitement of discovery with the support and intellectual stimulation of a diverse campus community. We seek to develop in each member of the MIT community the ability and passion to work wisely, creatively, and effectively for the betterment of humankind.*

We believe that an Institute commitment to sustainability fulfills this mission in a variety of ways:

- It spurs innovation in technologies and systems—from lab to marketplace.
- It upholds the campus as a model for sustainability.
- It empowers the next generation of students to explore and solve the complex problems of their time through immersive learning experiences.

With this report, we underscore the magnitude of the sustainability challenge and call for MIT to take a leadership role going forward, redoubling the Institute's current efforts. As a group, we debated and discussed both our collective vision for a sustainable campus and the complexity of addressing an issue that touches all aspects of our campus life. Quite simply, we believe that MIT cannot continue to fulfill its mission if it operates unsustainably in the short or long term. We believe there is intrinsic synergy between a sustainable Institute and the fulfillment of MIT's educational and research mission. Achieving

this mission requires that we embed sustainability in everything we do: research, education, operations, and the lessons we teach through example.

Given the interacting and evolving nature of sustainability challenges, along with the technological, organizational, and political strategies needed to address them, we view this report as an initial step in what must be an ongoing and continuously developing effort. Below, we outline five elements of a pathway by which MIT can formalize and build upon current efforts to address the challenges posed by sustainability and become a leader in this crucial arena. The Pathway to Sustainability Leadership calls upon MIT to become:

- An **exemplar** that incorporates sustainability considerations into campus infrastructure, operations, student life, and daily decisions
- A **model** of organizational transformation for sustainability leadership
- A **generator** of meaningful new sustainability ideas and research, building on our history and current capacity for contributing solutions toward 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 we operate, a clearinghouse of good ideas, and a mobilizer of actors who can implement sustainability solutions

In the end, we propose that MIT leverage its vision and act boldly to advance the **Pathway to Sustainability Leadership** and become an organizational standard-bearer for a sustainable future.

Looking Back to Look Forward

In 2016, we celebrated the 100th anniversary of MIT's move from Boston to Cambridge. Decisions made a century ago profoundly shaped our campus environment today. Chief among them was the decision to link diverse departments within one massive building, thus allowing for decades of communication and interaction among scientists, engineers, architects, and others in our community. Similarly, decisions we make today will influence our future quality of life and that of our successors.

A primary element in the Pathway to Sustainability Leadership is the idea of using the campus as a model for and center of organizational transformation and as an incubator of sustainability ideas and research. The scale and complexity of the sustainability challenge calls for short-, medium-, and long-term planning. This report lays out a vision of sustainability that considers a 100-year context—one that embraces MIT's history and looks ahead. In the short term, we call for the immediate development of a methodology to set sustainability goals and commitments for 2020 and 2025, consistent with and building upon the Paris Agreement (United Nations Framework Convention on Climate Change), the Cambridge Net Zero framework, and the MIT Plan for Climate Action. We recommend assessing the progress of the pathway's five elements and recalibrating them, if needed, at five-year intervals beginning in 2020.

In developing this pathway, task force members recognized within the community a number of significant opportunities for MIT to become a leader in the field. These include:

- The potential for linking MIT's research and teaching to campus operations and residential life in order to connect science with practice and to serve as a model for sustainability practice
- MIT's exceptional ability to prepare and motivate our graduates to address the ever-changing set of complex sustainability challenges they will confront
- The capacity for incorporating MIT's existing environmental and sustainability commitments into the pathway to sustainability leadership

- MIT's ability to constructively engage and influence, where feasible, important external stakeholders, ranging from government to the commercial and philanthropic communities

These opportunities in research, education, operations, living, and organizational transformation position MIT to serve as a powerful leader for sustainability.

The task force recognizes the many ongoing activities related to sustainability around the Institute and seeks to align with, connect, and expand upon them in the process of implementing this pathway. This report is intended as a living document, building on and integrating two recent relevant documents: 1) The MIT Plan for Action on Climate Change, in which the Institute embraces a leadership position on the issue via commitments in research, teaching, and campus operations; and 2) The MIT Sustainability Working Groups recommendations and commitments that reset MIT's operational approach to sustainable design and construction, lab design and management, stormwater and ecological land management, and materials management.

What Lies Ahead

Section 1 sets forth the challenge of sustainability and the ways in which MIT is positioned to generate solutions and models for sustainability through its research, teaching, and operations. Section 2 frames our approach, describing the individual, campus, city, and global scales at which MIT will strive for sustainability. Section 3 lays out five elements for MIT to pursue in striving for leadership in sustainability. The conclusion highlights the benefits that MIT's sustainability leadership could provide for our campus, our city, and beyond.

SECTION 1: THE CHALLENGE OF SUSTAINABILITY

Building a sustainable world is an immense challenge, but a necessary and, we strongly believe, realizable one. We draw on the classic definition of sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN WCED 1987). Institutions of higher education are perfectly positioned to explore the questions that emerge from this call to action via research and teaching and to seek solutions.

The Challenge, The Opportunity

The world economy has been growing at an average real rate of about 3.5% per year, with a doubling time of only 20 years.[1] Growth is far faster in emerging economies, where billions of people still live in poverty, without the food, housing, clean air and water, healthcare, education, opportunity, and freedom from fear that all people deserve. However, humanity has already exceeded the Earth's capacity to sustain our societies indefinitely at our current rate of use and consumption of resources (Running 2012).

From forests and fish to water and fossil fuels, we harvest and degrade our renewable resources faster than they can regenerate; we create pollution, waste, and greenhouse gases more quickly than they can be rendered harmless or sequestered; and we are overwhelmingly dependent on nonrenewable resources. Human society has exceeded sustainable limits for greenhouse gases, biodiversity loss, and other critical resources and ecosystems upon which our health, prosperity, and lives depend. At the same time, the United Nations projects world population will grow by more than two billion by the year 2050 and four billion by 2100, while consumption per capita continues to grow exponentially (UN DESA 2015).

[1] See World Bank, International Comparison Program database, GDP per capita based on purchasing power parity (current international $), 2009–2015. http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD

This is where the opportunity lies. Promoting health and wellbeing for a growing world population while reducing our global footprint to within Earth's capacity to sustain us is a defining challenge for the world's citizens in the 21st century, and for MIT. To address this challenge, we need to invent sustainable means to meet our needs for food, energy, materials, health, and access to these resources. To succeed—and to avoid unintended harmful consequences—new technologies must be grounded in rigorous scientific research. But the invention of promising new technologies alone is not sufficient. These inventions must move affordably and appropriately from the lab to the world. Their implementation requires support for entrepreneurship and commercialization, for learning and change in existing enterprises, and for public policies to speed regulatory change and support the adoption of sustainable technologies.

Finally, we need transformation. Innovation and implementation are essential but by themselves are insufficient. As long as everyone wants more—a higher income, more consumption, a larger gross domestic product, more than last year, more than others—innovations that ease scarcity or environmental degradation will simply enable more growth until new problems and limits arise. New technologies alone cannot create a sustainable economy and society. This raises uncomfortable questions. The world must make the transition to sustainability, yet it is unclear how to accomplish this with fairness and equity so that we can build a society in which all will thrive. We must move from this emerging vision of sustainability to rigorous research, innovations, and processes that help us understand the complex interconnectedness of systems, design better policies, facilitate individual and organizational learning, and catalyze the technical, economic, social, political, and personal changes we need to create a sustainable society.

What MIT Can Do

MIT can and should be a global leader in addressing these challenges. MIT is perhaps uniquely positioned to move beyond technological solutions because it is also endowed with strengths in the humanities, architecture, social sciences, economics, and management, and has a track record of interdisciplinary cooperation. MIT's multidisciplinary approach makes it a leader both in the technical innovation and in the research, teaching, and learning that must take place to ensure success. MIT's capabilities at the operational level with regard to design and construction, energy, transportation, food services, procurement, land management, and waste complement our academic and research endeavors, creating a mutual feedback loop.

MIT's campus can be used as a test bed for science and technology and for policy and decision making. Through the broad participation of faculty, staff, and students, the Institute can realize its potential as a sustainability incubator. Indeed, the Institute recently launched a multiyear fundraising campaign to develop resources for engaging MIT's community on these challenges. The MIT Campaign for a Better World prioritizes human health, the health of the planet, innovation and entrepreneurship, and education.

SECTION 2: FRAMING OUR APPROACH

Organizations need to undertake the transformations necessary in order for the world to become sustainable. Such transformation also requires a systems approach that frames and articulates the benefits and impacts of sustainability. This document frames the proposed pathway at four scales: the individual, the campus, the city, and the globe. The challenges that MIT faces—climate change, energy production and consumption, materials management, mobility, food systems, and more—have implications at each of these scales. This report calls upon MIT to assess our ability to study, to innovate, and, where feasible, to transform systems across these four scales.

Just as an incubator provides the conditions needed for the start of life, we use the term here to promote our own campus as a source of the research, teaching, and operations ideas necessary to

foster sustainability. We seek a "new normal" at MIT, in which anyone interested in contributing locally, regionally, nationally, or globally to issues of sustainability can find a supportive institutional setting. The challenges of sustainability invite all constituencies on campus to join in and contribute to the effort.

The Individual

MIT comprises a diverse set of individuals. Each member of the community—whether student, faculty, or staff—has the potential to contribute to a sustainable campus in unique ways. This report seeks to guide, incentivize, and empower individuals to make a sustainable campus the "new business as usual" and to welcome the contribution of each member of the MIT community in this endeavor.

Our ability to leverage the boundless imagination of the MIT community will fuel our commitment to sustainability. Success today and in the future depends upon our capacity to engage our community and to tap into our creativity and determination in the face of risk, uncertainty, and resistance from the status quo.

The Campus

The MIT campus operates 365 days a year, 24 hours a day. To carry out the Institute's mission, our students, faculty, and staff rely upon a resilient energy system that provides electricity, heat, and chilled water; flexible multimodal mobility options to access the campus; a reliable flow of goods and services; potable water and wastewater services; healthy food; and high-performance buildings—all to ensure continuous research and education within a healthy and productive teaching and learning environment. The resiliency of the campus to fulfill its mission in the face of intensifying climate hazards is a high priority for MIT. Understanding the interdependence of these systems is necessary to the development and management of a sustainable and resilient campus—today and into the future.

At the campus level, a commitment to sustainability is multifaceted. We will need to make the right decisions oriented to sustainability by establishing systems and procedures that elevate sustainability as a value on par with scheduling and cost. We will need to continually update our standards to reflect new data, conditions, and best practices. This process calls for leadership from the highest levels within the administration as well as at the unit level, and for ongoing, broad stakeholder engagement and interdepartmental collaboration. We will need to set goals, and develop and test pioneering solutions that lead to greater unification of the community across the unit, departmental, and institutional levels.

The campus is the home to our actions—the place where we demonstrate what we have learned. It must be an inclusive home, with sustainability ideas emerging from research, educational activities, community building, internal problem solving, and related processes.

The City

We recognize that our success will be dependent upon a clear understanding of our actions within the broader context of MIT's place in the city of Cambridge and the greater Boston area. Acting globally begins with local concerns. MIT is tied to and shares essential resources with Cambridge and Boston, ranging from infrastructure to the Charles River watershed. MIT's long and productive relationship with Cambridge—100 years and counting—may become an even more intimate partnership as we pursue shared solutions to climate and environmental challenges facing our community.

At the city and regional level, a commitment to sustainability must consider our impact on the quality of life for MIT and its surrounding communities. MIT seeks to continue partnerships for sustainability with the cities of Cambridge and Boston, building upon shared challenges and seeking solutions that have a measurable impact, where feasible, on campus and beyond.

The Globe

MIT recognizes that the underlying challenges of sustainability are global. We rely upon an interconnected world of goods and services, and our impacts can be measured upstream to downstream. We already are a global institution integrated into the fabric of our local surroundings. We also recognize that we educate, host, and employ thousands of potential "ambassadors" on our campus who carry forth values learned not only through formal study but through our daily actions. Eleven percent of undergraduates, 43% of graduate students, 42% of the faculty, and 65% of our postdoctoral scholars are international. Each year, more than 900,000 students worldwide enroll in online MITx courses. The Institute has more than 350 internationally funded research projects.

At the global level, a commitment to sustainability calls for a vision that is measurable and replicable, and that can be the basis for mobilization throughout the nation and the world.

SECTION 3: PATHWAY TO SUSTAINABILITY LEADERSHIP BY MIT

The members of the Campus Sustainability Task Force outlined five elements that make up the **Pathway to Sustainability Leadership by MIT**. These elements seek to deepen and build upon an already activated foundation of climate and sustainability leadership in a manner that matches the complexity and magnitude of the challenge at hand. We seek a process that will empower members of the MIT community to confront our unknown future and to take action in the face of that uncertainty.

Our vision is to educate the next generation of students to confront and solve complex global challenges; to engage our staff as lifelong learners who grapple with the complexity of sustainability in their daily work; to spawn new sustainability research among faculty and researchers; to transform our organization into an engine of sustainability practices; and to act as a thoughtful partner in our communities, collect and disseminate good ideas, and mobilize actors to implement sustainability solutions.

This pathway articulates a vision and phased approach of commitments that will guide MIT's leadership from the present through 2025. This report is intended to be a living document that requires ongoing engagement from the MIT community and sustained guidance from committed leadership. The Office of Sustainability, the Environmental Solutions Initiative, and the MIT Energy Initiative pledge to work collectively with other campus partners to ensure that MIT fulfills the commitments outlined in this report. However, success requires the participation of all members of the MIT community. We recommend an annual call to action to review and set goals, apply new knowledge, catalyze research, seek course correction, and collaborate with partners on campus and beyond.

The pathway for MIT to attain leadership in sustainability through incubation, transformation, and mobilization is outlined below. Each element of the pathway includes a goal and a series of commitments.

Model of Sustainability

MIT must exemplify the incorporation of sustainability principles and practices into campus infrastructure, operations, student life, and daily decision making.

Our commitment to sustainability is girded by scientific research that shows that efforts to meet the needs of an ever-increasing global population are undermining the natural environment's essential life-support systems. As an Institute, we have great capacity to tackle this challenge and to find and test solutions. The campus and community will be a test bed used to understand and solve complex challenges faced by an organization that exists within a municipality, a city, a state, a region, and a nation.

A commitment to becoming a sustainable campus calls for transformation of the physical and operational environment of the MIT campus. This commitment must permeate the Institute, becoming a core value that contributes to the state of the campus. In turn, MIT must then become a model for other organizations around the world to emulate.

This calls for leaders and decision makers at all levels throughout MIT to transparently examine how best to balance MIT's growth with its environmental and human health impacts. Such a process requires quantitative and qualitative data to guide decision making and measure progress over time. The accumulated data will inform decisions about what practices to put into place to support and enable the organizational transformation.

Through data-driven practice, MIT will use its campus to understand and solve complex environmental challenges, and will provide a model of environmental sustainability.

Commitments

1. Leveraging the scientific expertise of MIT faculty, staff, and students, develop a methodology for sustainability goal setting and set short- and medium-term goals for the campus.
2. Adopt a long-term perspective on life-cycle costs in all units at MIT that acknowledges the long-term presence of the Institute in Cambridge and our impact on the economy and intellectual landscape of the greater Boston region.
3. Ensure that MIT sustainability commitments support the evolving nature of a university campus and inform the Institute's overall campus planning process.
4. Create model sustainable-living communities for students so they can innovate and experience cutting-edge sustainable living choices within a connected urban environment.
5. Establish full accountability and transparent reporting from leadership across the Institute via an annual campus sustainability report developed by the Office of Sustainability.

Transformed Organization

MIT must transform itself into a resilient and environmentally sustainable organization, demonstrating and modeling the process for such transformation.

Organizational transformation calls for a deep understanding of the problems at hand, of the way the organization functions, and of the vision that guides and motivates its members. Transformation calls for a fundamental change in thinking and in practice, data-driven decision making, and institution-wide environmental practices. We believe there is a fundamental alignment between a sustainable Institute and the fulfillment of our mission. Achieving this will require examining the Institute's decision-making frameworks and wrestling with the inherent trade-offs among money, time, health, and the environment. It will require inducing meaningful behavioral change and promoting effective solutions to pressing climate and global environmental challenges in order to support the world's ability to live and operate in a viable way.

We seek to catalyze and implement innovative sustainability research to inform how to achieve sustainable systems and organizations.

Commitments

1. Embed sustainability into all aspects of the MIT experience, ranging from dorms, living groups, classrooms, labs, offices, and other facilities to our integration with the broader community.
2. Establish appropriate governance and management systems on an as-needed basis to ensure short- and long-term sustainability transformation on campus.

3. Develop systems at all levels—from basic campus maintenance to research and educational impacts—to monitor performance against sustainability goals, identify gaps, and take corrective action.
4. Build the capacity of decision makers at all levels and of all MIT stakeholders to take responsibility for sustainability in order to ensure the success of the Institute's mission and goals.
5. Develop mechanisms by which every member of MIT can contribute to the success of these commitments.

Generator of Sustainability Research

MIT must become a generator of new ideas and meaningful sustainability research, building on its history and capacity for contributing solutions to vital global needs and priorities.

As we have now seen for decades, science is essential to our understanding of the world and our climate, but science alone cannot lead to positive action and changes. MIT has made significant contributions to fundamental research in climate change that have directly improved our ability to forecast likely futures and plan for humane and reasoned responses and actions. Today more than ever, though, research in the sciences must be accompanied by research in other fields because the world is experiencing social, economic, and cultural disruptions on an unprecedented scale. All five schools at MIT are involved in answering the most pressing questions and offering solutions for a sustainable future. Research from MIT scientists, engineers, urban planners and architects, political and social scientists, economists, artists, and more comprise the kaleidoscope of knowledge creation, invention, policy formulation, and design that will galvanize local and global action. The combination of interdisciplinary engagement coupled with explicit means of mobilizing the MIT community will maximize our contribution to positive change. MIT's rich intellectual landscape supports the priorities of a sustainable campus; now we must support and mobilize our communities to expand the reach of this knowledge. MIT's focus is consistent with what it has always done: *bring its knowledge and expertise to bear on the world's great challenges*.

We seek to generate opportunities to expand and apply MIT research regarding environment and sustainability.

Commitments

1. Embed within the planning, development, and maintenance of MIT the information tools necessary to enable the campus to serve as a test bed for research, novel solutions, innovation, implementation, and transformation toward sustainable practices at every level and within every unit of the Institute.
2. Provide ongoing, expanded opportunities for MIT faculty, staff, and students to implement the research and technology emerging from our labs and classrooms; expand the reach of those opportunities by partnering with the cities of Cambridge and Boston, and beyond.
3. Establish an open access database of research and implementation opportunities that enlists the efforts and resources of the Environmental Solutions Initiative, the MIT Energy Initiative, the MIT Innovation Initiative, and other Institute-wide organizations and associated research groups, labs, and entities, and connect it with the venture and angel investing community that orbits MIT generally and, specifically, with the newly opened MIT Engine.
4. Develop metrics and monitor progress to measure the success of applying research results to creating a sustainable campus.

Educational Innovator

MIT must be an innovator of educational experiences for its diverse communities of learners, both on and off campus.

The urgent need for solutions addressing the consequences of climate change calls for immediate action. While additional research is needed to establish a better understanding of the range and nature of these consequences, more than enough is known to compel society to act now to stem the tide of emerging problems that threaten economies, institutions, and entire societies across the globe. Actions of all kinds will be needed to mitigate carbon emissions, provide strategies and technologies for removing and storing carbon dioxide from the atmosphere, and even help people adapt to climate change.

Lost in the discussion of solutions is the pivotal role of education—probably the most effective measure toward achieving long-lasting, transformative, and paradigm-shifting change. For example, while fundamental research in applied math and computer science led to the information revolution, it was advanced education that created the legions of engineers and scientists who created the boundless digital world that is increasingly intertwined with our physical world. While the convergence of genetics and microbiology sparked a revolution in life sciences and health care, advanced education created an intellectual explosion that created new companies and led to lifesaving breakthroughs for various cancers and new approaches to reduce the spread of and treat many communicable diseases. Research creates knowledge, but education confers that knowledge to the world.

Both today's environmental and climate change challenges and those that will arise have been hundreds of years in the making and, by all accounts, will require many decades if not hundreds of years to solve. A 22-year-old MIT Class of 2017 graduate has a life expectancy of more than 82 years. The working life of that student may be as long as 40 years or more, extending into the latter half of the 21st century, when some of the most dire consequences of climate change will have become manifest. We know from alumni what a powerful influence their time at MIT has had on their personal and professional trajectories. Research and technological breakthroughs provide the substance for change in the world, but it is the people working in industry, government, and civil society who act as catalysts, bringing that change to bear. Providing a rich, rigorous, and empowering education to students interested in contributing to a sustainable future is our most powerful weapon in the fight against climate change.

We seek to generate opportunities to expand and mobilize the MIT educational enterprise in environment and sustainability with the aim of creating a sustainable campus and world.

Commitments

1. Develop a portfolio of diverse curricular and extracurricular experiences to serve all MIT undergraduate and graduate students; ensure that all MIT students have access to comprehensive sustainability education.
2. Establish a central information portal for all student sustainability learning opportunities, including undergraduate and graduate subjects, learning modules associated with the campus as a living laboratory, student-supported and peer-to-peer learning projects, and outreach opportunities for teaching and learning.
3. Create a sustainability career "ecosystem" involving campus organizations, networks of MIT alumni, and friends of MIT who are committed to guiding the next generation. The ecosystem will provide professional development tools and student advising through a roadmap of the local, regional, national, and international career pathways for students from all majors and disciplines.
4. Build mechanisms for linking MIT's educational efforts, both in the classroom and through edX and MITx, with innovation and entrepreneurial thinking.
5. Provide ongoing, expanded opportunities for MIT students to explore and engage in innovation and entrepreneurship activities that can lead to the creation of successful startups.

Thoughtful Partner, Disseminator, and Mobilizer

MIT must be a thoughtful partner within its local and global communities, a disseminator of great ideas, and a mobilizer of actors to implement sustainability solutions.

MIT is poised to work in step with its contemporaries to facilitate expanded thinking and collective progress. The Institute must engage multi-stakeholder and higher education networks at the local, state, regional, national, and international scales to enable idea sharing, leapfrogging, and the advancement of cutting-edge concepts and technologies.

Therefore, MIT must strive to bring diverse perspectives to bear upon the challenge of finding comprehensive solutions to the complex problems of sustainability.

Commitments

1. Create multiple venues for on-campus dialogues that inform and challenge a vision of sustainability at MIT.
2. Deepen partnerships with the cities of Cambridge and Boston to create and implement more impactful solutions.
3. Seek opportunities to convene stakeholders, from the local to the global scale, with diverse perspectives to develop solutions, and mobilize the appropriate actors to implement them.

CONCLUSION: THE PATH FORWARD

In light of its mission and history, MIT is exceptionally well-positioned to take the lead and join forces with committed partners in devising evidence-based solutions for sustainability. We are poised to transform the campus into a scalable laboratory in which to devise, pilot, implement, and evaluate sustainable campus-based and urban strategies to combat climate change. The Institute's efforts to demonstrate best practices in limiting carbon emissions and decreasing adverse effects on both the environment and on human health will help expose all members of its community—who are full participants in this campus-wide effort—to the challenges of grappling with complex problems and working across seemingly disparate disciplines and functions.

MIT is on a path toward creating a sustainable organization, but different steps will advance at different rates. Some require a thoughtful stakeholder engagement process over the long-term. Other efforts need to be implemented swiftly. We are well versed in meeting challenges such as urgent problems and budget constraints as well as the short-term and long-term impacts of our day-to-day decisions. We must consider and define what it means to develop an adaptable, flexible, values-based sustainability model that both supports the Institute's mission and becomes integral to it.

Our work has only just begun.

SOURCES

References

Notes: *More information and scientific background about the necessary conditions for sustainability can be found in Sterman (2012) and references therein; see also Hoekstra and Weidmann (2014), Rockström et al. (2009), Running (2012), and Steffen et al. (2015).*

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Websites

Global Footprint Network
MIT Climate Action
MIT Office of Sustainability, Sustainability Working Group Recommendations
MIT Office of Sustainability, Thriving Networks
The World Bank, Indicators

APPENDIX 1: CAMPUS SUSTAINABILITY TASK FORCE MEMBERS

The Campus Sustainability Task Force was charged with shaping the vision and creating a plan of action for MIT to become a state-of-the-art sustainable campus. We sought feedback from the MIT community via an Idea Bank, meetings with various stakeholder groups, and input from current sustainability working groups and committees. That feedback is reflected in this document.

Co-chairs

Andrea Campbell, Department of Political Science

Julie Newman, MIT Office of Sustainability

Members

John Fernández, MIT Environmental Solutions Initiative and Department of Architecture

Howard Heller, MIT Medical

Sara Malconian, Sourcing and Procurement (2011–2016)

Maureen McCaffrey, MIT Investment Management Company

Francis O'Sullivan, MIT Energy Initiative and Sloan School of Management

Christopher Schuh, Department of Materials Science and Engineering

Noelle Eckley Selin, Institute for Data, Systems, and Society, and Department of Earth, Atmospheric, and Planetary Sciences

John Sterman, Sloan School of Management

Dennis Swinford, Office of Campus Planning (2015–2017)

Linda Wei Jing '17; Campus Sustainability Fellow

Philip Kreycik SM '16, MCP '16

APPENDIX 2: MIT ENTITIES THAT ADVANCE SUSTAINABILITY

Below are many of the entities at MIT that are leading innovative research projects and initiatives related to sustainability that informed our understanding of MIT's leadership position.

Institute-level Initiatives and Offices

Environmental Solutions Initiative
MIT Energy Initiative
MIT Office of Sustainability

Academic and Research Entities

City Science group (MIT Media Lab)
Climate CoLab (MIT Center for Collective Intelligence)
Concrete Sustainability Hub (Department of Civil and Environmental Engineering)
Department of Urban Studies and Planning
D-Lab (Edgerton Center)
Joint Program on the Science and Policy of Global Change
MIT Center for Energy and Environmental Policy Research
MIT Community Innovators Lab (Department of Urban Studies and Planning)
MIT Laboratory for Aviation and the Environment (Department of Aeronautics and Astronautics)
MIT Sustainable Design Lab (Building Technology Program, Department of Architecture)
Open Agriculture Initiative (MIT Media Lab)
Sloan Sustainability Initiative
Transportation@MIT (School of Engineering)

Staff Sustainability Initiatives

Working Green at MIT

Student Sustainability Initiatives

Undergraduate Association Committee on Sustainability
Graduate Student Council Sustainability Subcommittee
MIT Energy Club
MIT Food and Agriculture Club
MIT Sustainability Summit
MIT Water Club