
A Time for Action

First, I worry about climate change. . . . It's the only thing that I believe has the power to fundamentally end the march of civilization as we know it and make lots of other efforts that we're making irrelevant and impossible.

—Former U.S. President Bill Clinton speaking at the World Economic Forum, January 28, 2006

Our Imperiled Planet

Across Alaska climate change is an accepted fact of life. In Fairbanks, the permafrost is thawing earlier and deeper than it has in the past. Houses and trees have sunk into the softened ground, roads have buckled, and telephone poles are tilted. Northern Russian communities are experiencing the same problems. Indigenous Arctic peoples living on small islands off the Alaskan coast are having to move as erosion from winter waves—no longer contained by ice—gradually washes away their villages. The U.S. government expects to spend over 100 million dollars relocating the residents of Shishmaref and Kivalina islands to dry land.¹

According to the National Oceanic and Atmospheric Administration (NOAA), “Global mean sea level has been rising at an average rate of 1 to 2 mm/year over the past 100 years, which is significantly larger than the rate averaged over the last several thousand years.”² And NOAA also notes that “for the Northern Hemisphere summer temperature, recent decades appear to be the warmest since at least about 1000 AD, and the warming since the late 19th century is unprecedented over the last 1000 years.”³

Warmer oceans feed more powerful storms. Hurricanes Katrina and Rita, which devastated Louisiana and Mississippi in the late summer of

2005, were fueled by above-average water temperatures in the Gulf of Mexico. Unpredictable and extreme weather events are a hallmark of the nonlinear character of climate change. Scientists predict heavier rainfall in the wettest parts of the world and extreme drought in arid regions, including sub-Saharan Africa and much of the United States, as the planet continues to heat up. Drought in Africa and floods in Bangladesh will bring starvation to millions. Left unchecked, human-induced climate change will bring rising seas, flooded coastal cities, loss of wetlands, and rapid alterations in reproduction and migration patterns of plants, animals, and diseases. Many key species have temperature tipping points, above or below which they cannot thrive. Only a 2°C increase in temperature in the coffee-growing region of Uganda will reduce crop yields by 90 percent. In the Indian Ocean island nation of the Maldives, where 75 percent of the land is less than one meter above mean sea level, decisions are being taken about which settlements to abandon.⁴

A diminishing number of politicians, business leaders, economists, and journalists continue to claim that the verdict is still out on the human impact on global warming; they continue to downplay the negative consequences of climate change in their opposition to regulation of the greenhouse gases we put into the atmosphere by burning coal, oil, and gas and by clear-cutting forests. In contrast to lay critics, scientists agree with climate change statements such as the following by United Nations Intergovernmental Panel on Climate Change (IPCC):

Human activities—primarily burning of fossil fuels and changes in land cover—are modifying the concentration of atmospheric constituents or properties of the Earth's surface that absorb or scatter radiant energy. In particular, increases in the concentrations of greenhouse gases (GHGs) and aerosols are strongly implicated as contributors to climatic changes observed during the 20th century and are expected to contribute to further changes in climate in the 21st century and beyond. These changes in atmospheric composition are likely to alter temperatures, precipitation patterns, sea level, extreme events, and other aspects of climate on which the natural environment and human systems depend.⁵

The evidence of global warming has been accumulating for decades. What we had thought would be a problem for our children and grandchildren is a problem now, although future generations will suffer the most profound effects. Some businesses are alert to the economic consequences of doing nothing. The insurance industry, seeing the pattern

in changes in claim rates, extreme-weather-event liabilities, and World Meteorological Organization climate predictions, has begun to advocate for reductions in heat-trapping gas emissions.

The College and University Climate Change Imperative

Climate change will affect all of us. The cost and availability of many resources—from water to food—may be affected by global climate change. College and university infrastructure will be profoundly affected. In Boston, increased vulnerability to severe storms and sea-level rise are expected to negatively affect water supply, transportation, and many buildings close to the water.⁶ The area's many colleges and university buildings are susceptible to damage. Costs of occupant comfort, energy supplies, water, and food are expected to rise with climate change. As fewer areas experience freezing temperatures, we can expect to see insect-borne diseases such as malaria, dengue fever, and Lyme disease move north. United Nations Environment Programme maps show malaria as a key health concern for U.S. college and university health services as temperatures rise.⁷ We offer this strategic and tactical guide to taking climate change action on campus and off.

How Colleges and Universities Can Make a Difference

Stories of climate action are emerging on campuses across the country: stories of grassroots efforts of dedicated individuals, top-down institutional responses, and creative collaborations with governments, non-government organizations, and the private sector. These groups are blazing the trail for others to follow to take action to reduce climate-altering gas emissions.

The Tufts story begins in 1998, with William Moomaw, professor at the Fletcher School of Law and Diplomacy, and Kelly Sims, then a master's candidate at Fletcher. Moomaw is the senior director of the Tufts Institute for the Environment and an active contributor to the Intergovernmental Panel on Climate Change. Sims came to Fletcher after years as Science Policy Director at Ozone Action in Washington, D.C. They both had become frustrated and angry at the U.S. government's refusal to act on climate change. Moomaw converted his frustration into a

challenge: “What if we are joined by others in making a commitment to meeting or beating the emission reductions associated with the Kyoto Protocol? Maybe we can shame people in Washington into acting responsibly. If the people lead, maybe the leaders will follow.”

At an April 1999 conference, the Tufts Climate Initiative was born when Tufts President John DiBiaggio, along with a handful of companies and nongovernmental organizations, announced their commitment to reducing climate-altering emissions. More ambitious measures have since been endorsed by Tufts’ current president, Lawrence Bacow. Tufts made a strategic decision to continue its leadership in developing and implementing a campus stewardship program; we had both experience and data. Prominent Tufts interdisciplinary programs have a track record of fostering productive working relationships among faculty, staff, and students across Tufts departments and schools. Before committing to specific emission targets Tufts made rough estimates of campus carbon emissions. Benefits in reducing emissions ranged from efficiency savings to creating opportunities for students, faculty, and staff to engage in active citizenship on campus and in our communities.

Why Colleges and Universities Must Take the Lead in Climate Action

Academic institutions are well suited to take on the climate change leadership challenge. Our primary mission is to educate future generations of leaders; thus, concern for future generations and sustainable development are intrinsic to education and a countervailing force to the cycle of short-term selfish decision making that has become acceptable in some sectors of society. The university is an ideal learning laboratory, creating opportunities for hands-on experimentation ranging from modest to transformational climate action projects.

In the political realm, in science, technology, policy, planning, public understanding, social responsibility, implementation, and communication, climate change provides opportunities for colleges and universities to exercise leadership:

- Acting as responsible members of their communities to reduce emissions
- Conducting research on a range of questions related to climate change and energy
- Educating within academia and in the broader community

- Acting out of self-interest to reduce energy costs and increase energy reliability
- Contributing to a more civil society

Taking climate change seriously involves forging new collaborations, reaching deep into an organization's decision-making process, and influencing social dynamics and personal behaviors.

Like many institutions, Tufts faces financial challenges, so the unspoken rule is that any new activity must save money, bring in new sources of revenue, or create value to the university in some other way. Climate change strategies may necessitate a nontraditional view of investments. The opportunity to reduce costs in the long run is a very compelling rationale for embracing a commitment to climate change.

The flattened hierarchy of most academic institutions supports the emergence of champions at just about any place in the organization. The great degree of autonomy given to many decision makers in academia can also lead to well-intentioned but uncoordinated, inefficient actions that may alienate the very people who supply or control resources. Climate activists must be sensitive to this dynamic.

Top administrators are important participants in climate change discussions because they are often in the best position to recognize the strategic aspects of making a public commitment and tracking progress against a quantifiable goal. Supervisors of campus construction and staff who operate and maintain a school's complex infrastructure have critical planning and implementation roles to play in order to make climate change policies work. When fiscal goals and intellectual pursuits are aligned, as can be the case with emission reduction schemes, exciting new collaborations can emerge within the institution.

The energy used in heating and cooling campus buildings with fossil fuel is a significant source of heat-trapping gas emissions. As a consequence, the design of new buildings and the renovation of existing facilities create enormous opportunities for capturing energy efficiency that will reduce emissions and save money in the long run. All parties, including donors, trustees, architects, engineers, contractors, building occupants, faculty, students, staff, alumni, and administrators, need to be engaged if positive outcomes are to be realized.

For faculty in a very wide range of disciplines, climate change presents rich opportunities for teaching, research, and community action. We

offer curricular reflections based on approaches we and our colleagues have taken.

Because students remain on campus for a relatively short time, their efforts devoted to climate action can be lost to the community when they graduate. Students generate a level of enthusiasm, passion, and excitement that gets many new projects off the ground. We offer a detailed conceptual map to tie the pieces together across groups and across time—for example, as students transition to alumni and colleges make connections to keep them involved.

Given the considerable variation across academic institutions, it can be a challenge to determine who needs to be involved in reducing the organization's contribution to climate change. As a result, we focus on understanding an institution's decision-making framework. Whatever the model, people are at the center of successful climate change action measures; the more people understand climate action, the more rapidly progress can be made. We provide an introduction to the technical knowledge you need in order to communicate effectively with professionals in the trades to develop the most efficient climate change mitigation solutions tailored to your campus. We also provide additional references and resources to expand your climate action knowledge.

Why We Must Focus on Climate Change and Do It Now

Our Arctic neighbors have sent us clear images of what is in store for the rest of the planet if we delay. Climate change demands attention. The unwillingness of political leaders in either major political party in Washington to ratify the Kyoto Protocol was the catalyst for the initial commitment at Tufts, but it is not the sole factor sustaining the effort. The energy crisis of the 1970s motivated many colleges and universities to take aggressive efficiency measures, many of which were subsequently relegated to the dustbin of institutional memory as fuel costs decreased. Energy costs and reliability are again a concern for institutional decision makers; technological developments since the 1970s have brought many new long-term operational savings. For the university of the future, lower energy costs and increased reliability can be a significant competitive advantage.

Climate change is inherently different from regional and local environmental problems such as water quality and waste disposal. Water and

waste solutions can be developed in communities, regions, or watersheds where the people who invested in resource protection can observe and measure the results. But climate-altering gases are international travelers. Emissions contribute equally to global climate change regardless of where they are released, just as ozone-depleting chemicals did by opening holes in the ozone layer of the stratosphere. The ozone-depletion problem involved a relatively small number of human-made chemicals produced by a limited number of manufacturers. When DuPont, the largest manufacturer, announced ambitious plans to scale back and then eliminate the production of ozone-depleting chemicals on the target list, international consensus on phaseout timetables soon emerged and was reflected in the Montreal Protocol. In contrast to ozone, the most prevalent gases that contribute to climate change are associated with ubiquitous processes such as combustion (carbon dioxide), decay (methane), and agriculture (methane and nitrous oxide). This means that we all generate greenhouse gas, whether we are subsistence farmers burning wood for cooking fuel, office workers in an insurance company, parents driving children to soccer games, or executives at General Motors.

Decision makers in many companies take climate change seriously. In a 1998 survey of Fortune 500 companies, Ann Rappaport and John Blydenburgh⁸ asked environment personnel what they believe will be the greatest environmental challenge for their company over the next ten years. Climate change was the most frequently selected response (25.5 percent), followed by sustainable development (15.3 percent). Responding to both climate change and sustainable development requires companies to engage in long-term planning. Often companies are criticized for the short-term focus of their financial and environmental strategies. More recently, companies such as Swiss Re have been articulating the link between climate change and the long-term financial viability of a wide range of industries.⁹ Climate change also has clear implications for the investment portfolios of universities, colleges, and other institutions.¹⁰

Research reveals that Americans believe climate change exists, but that many people do not understand that climate change is human-made and that there are solutions available to reduce their contribution. Few people understand that burning fossil fuels is the most important contributor to climate change,¹¹ or make the connection that most of the electricity in

the United States is generated by burning fossil fuels. Student surveys at Tufts reveal some of the same misunderstandings.

Academic Research and Teaching for Climate Action

Clearly an educational effort is needed to frame effective efforts that yield constructive action; academia is an ideal place to develop and test strategies. However, educational efforts must move well beyond the classroom, and quickly, to reach the full range of climate change decision makers.

Although the complexity of climate change and the multiplicity of climate-altering gas sources presents an enormous challenge, such complexity is tailor-made for academic inquiry and knowledge-inspired action across disciplines from engineering (designing highly efficient motors, developing renewable power technologies or improved energy systems) to the humanities (examining the nature of our generation's obligations to manage resources in a way that does not compromise future generations). Crafting effective and efficient actions is also a much more complex challenge than classic antipollution campaigns and slogans, such as "reduce, reuse, recycle." Sophisticated systems approaches are needed to identify actions that minimize climate-altering gas emissions and maximize returns on investments.

A great deal of academic and media criticism has been focused on the Kyoto Protocol, providing rich source material for courses on climate change and environmental stewardship. There is a vast difference between debating approaches, as politicians are still doing, and taking action, which is what we all can and should be doing.

Where to Begin: Establishing a Baseline

The Kyoto Protocol uses 1990 emissions as a baseline, so the first step is to quantify 1990 emissions, current emissions, and growth projections, so that emission reduction targets can be established. This is conceptually clear and simple; however, moving from idea to action is not so easy. Participating in the development of an emissions inventory for an organization such as a university illustrates how challenging it can be to execute such a simple concept in real life. And if it is difficult to develop an inventory for a reasonably well-managed university community, the implications for conducting an emissions inventory in a large, diverse industrial or developing country immediately become clear. Academic

institutions are well placed to design and implement better tools and strategies.

Once an emissions inventory has been developed, it is then possible to evaluate progress toward quantitative goals on a regular basis. The fact that greenhouse gas reductions lend themselves so well to evaluation is another substantial asset of embracing climate change. Emissions can be tracked on several levels, informing both campuswide and individual project decisions. Actions taken to reduce greenhouse gas emissions are more costly than measures typically taken as part of campus greening; as a consequence, it may be important to establish a sound fiscal basis for investments. With relatively little effort it is possible to calculate payback periods for activities such as lighting efficiency improvements, and to compare the costs per unit of carbon reduced for most alternative program approaches. The ability to evaluate progress is a significant educational and managerial asset.

Linking Research and Action

Climate change research and action span social, environmental, and economic systems. Research to refine our understanding of global warming's consequences and action to address these problems can and must be carried out simultaneously. Climate change has been the subject of thoughtful and rigorous scientific inquiry, extensive diplomatic negotiations, and shameless political manipulation. Political leaders in Washington have delivered unclear and confusing messages as to what can be done about climate change.

There is a false notion in the public discourse that taking unilateral action on climate change is a foolish waste of money. In fact, many energy-efficiency measures applied to buildings will yield operational cost savings that will accrue over the entire operational life of a building, which for most colleges and universities will be many decades to a century or more. The public discourse has been incomplete because it fails to pose and examine very important questions:

- What will be the impact on us of reducing emissions?
- How will our lives be different if we take measures now that benefit future generations?
- Might these measures also confer benefits on us in the short term?

- What kinds of actions do we have to take to reduce climate-altering emissions?
- What will it take for our organizations to meet or beat the emission reductions associated with the Kyoto Protocol?

At Tufts we have begun to answer these questions.

How You Can Use This Book to Plan and to Act

We expect that readers of this book will have a range of skills relative to and knowledge of climate issues. We provide general information for those new to the subject along with detailed explanations to inform climate action planning. We have designed some of the chapters to be used as stand-alone guides for those who are well grounded in climate issues and need to focus on a particular process or problem. You can jump right into the chapters on buildings, for example, if that is where you need or want to concentrate your efforts.

Chapter 2 covers the basics of climate change, and also provides a brief discussion of state and local action and emissions of select countries. The country data provide a context for examining the emissions of colleges and universities, particularly in relation to relative wealth. The chapter also covers the major types and sources of heat-trapping gas emissions at colleges and universities.

Chapter 3 focuses on the emissions inventory and on setting goals for climate action. One of the great challenges of taking climate change action at a college or university is learning what actions are most effective and most significant. The campus heat-trapping gas inventory section introduces the sources associated with the highest level of emissions.

Chapter 4 discusses climate actors in a university setting. Every member of the college community makes decisions that affect the level of heat-trapping gas emissions, but some decision makers have more authority than others to make dramatic changes. And some have larger budgets. You need to understand these players' roles, agendas, and priorities to work most effectively with them.

Chapter 5 covers strategies and tactics to achieve emission reduction goals. We discuss projects ranging from the glamorous to the obscure, each with different emission implications. Decision making to inform

climate action also needs to take into account the cost of emission-reducing measures, the priorities of the institution, the magnitude of the reduction, and the opportunities presented by alternative campus activities and plans.

Chapters 6 and 7 take a very close look at campus buildings where you will find the greatest opportunities for emission reductions and life-cycle cost savings. Chapter 6 covers the incremental measures you can take as part of building management and upgrading. Chapter 7 begins at the planning stage for new buildings, offering strategies to get integrated design and performance solutions embedded in the minds of the designers and engineers. Chapter 7 follows the process through construction and testing, with tips for the climate activist on how to champion low-emission, healthy building design options at every stage.

Opportunities to make a difference go well beyond buildings. Operations, the subject of chapter 8, offers numerous places to reduce emissions in purchasing and transportation.

Chapter 9 looks at planning and policies that affect a college or university's emissions. Program planning and evaluation for the climate advocate as well as institutional planning, including master planning and fiscal planning, are covered.

Chapter 10 looks at personal actions each member of the college community can take to reduce global warming. This information is directly transferable to personal decisions made by people outside a college or university campus.

Some of the work of the Tufts Climate Initiative has been informed by student projects. Chapter 11 takes climate action projects into the classroom. We offer faculty suggestions for projects and approaches to inspire students, giving them the satisfaction that comes from creating value for campus decision makers and the community.

Tapping into Hidden Student Energy: Stories to Inspire Action

The story of one student group, Environmental Consciousness Outreach (ECO), offers a case study in community commitment. In 2005 Tufts ECO students worked for months organizing a wind-power referendum. They raised awareness. They educated about the link between climate change and electricity from fossil fuel. They invited speakers and staged events. ECO planned a student referendum in the spring of 2005 to

support university purchase of wind power. An error in producing the ballot left the measure off the regular student government ballot. A delay until the next regular election in the fall had some strategic merit, but one of the prime movers was a senior who would be graduating.

A makeup vote just for the wind petition was scheduled, but wind-power advocates were given only two days' notice. And the vote would be during reading period before final exams. Who would pay attention? How could advocates possibly get the 25 percent participation required for a valid vote? On voting day as advocates planted hundreds of orange, green, and yellow pinwheels on the academic quad a cold drizzle was falling. Would anyone care? When voting closed at midnight, 40 percent of the students had participated with 88 percent voting for the wind initiative. Equally important was the 40 percent voter turnout, higher than participation in the regularly scheduled student government election. Is it possible that interest in climate action will engage students more broadly in political participation and local and national governance?

In the final chapter of this book we reflect on what inspires action and what makes a credible effort by colleges and universities committed to climate action. We argue that only by going well beyond business as usual can institutions legitimately claim that they are acting responsibly and educating future generations for a world transformed by global warming.

Summary

Colleges and universities, like most people, organizations, and companies, contribute to global warming while conducting normal activities. People are increasingly concerned about climate change because they understand that the consequences for human well-being and for ecosystems may be dramatic. Yet few people know how to transform their concern into action. Through education and innovation, colleges and universities have a unique opportunity to lead the transformation. Colleges and universities can reduce their emissions of heat-trapping gas at the same time they educate and inspire members of their communities, develop new technologies and, in many cases, reduce long-term energy costs.