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“What do we mean when we talk about sustainability? There are many ways to define it, but they all reflect a simple truth. We’re a species of unlimited appetites living on a planet with limited resources. Our population, our wealth, and our expectations have all grown dramatically in recent decades, while the Earth, if anything has grown smaller as our technological reach has drawn us closer together. We can no more turn our backs on the progress of the past century than we can create a larger planet. But that doesn’t mean we’re without hope. Indeed, it is hope, together with determination, creativity, and innovation, that we need most now.”

From EarthPulse: State of the Earth 2010, National Geographic Society

The University of Maine Climate Action Plan

Climate Protection through Renewable Energy, Efficiency, and Innovation

Report of the Office of Sustainability
January 2010



Office of the President



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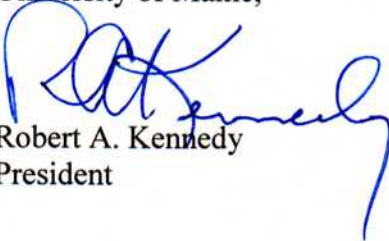
Dear Family and Friends of UMaine,

I am delighted to present to you the Campus Climate Action Plan for the University of Maine. This plan outlines a comprehensive planning framework which will guide the University as it works to reduce its net emissions of greenhouse gases to zero by 2040. More importantly, the plan reflects UMaine's deep commitment to its mission as a Land-Grant Institution devoted to truly vibrant engagement with the world outside the walls of the academy.

The Campus Planning Committee, the Office of Facilities Management, the campus Sustainability Coordinator, and the University of Maine Sustainability Alliance will work cooperatively to ensure the success of this plan. Every two years, and with the participation of the greater university community, UMaine will submit a written status report that outlines progress to date and makes recommendations for further actions.

I thank the many University employees and students who have contributed to this effort, especially Misa Saros, UMaine's Sustainability Coordinator, and Elaine Clark, UMaine's Executive Director of Facilities, Real Estate, and Planning.

With warmest regards and sincerest appreciation for your continued interest in the University of Maine,



Robert A. Kennedy
President

The Challenge of Climate Protection: A Call to Action

In recent years, colleges and universities around the world have embraced the concept of environmental sustainability as a central guiding principle in institutional planning. The explicit realization that higher education is a significant consumer of energy and natural resources, along with growing concerns regarding the activities and material by-products of modern industrial society and their attendant effects upon global climate and natural ecosystems, have inspired many academic communities to reconsider the way they do business. This new approach to institutional organization takes place in the context of shrinking federal and state funding, fluctuating energy and commodity prices, increasing energy and financial insecurity, and ongoing technological change.

Without a doubt, the challenges faced by colleges and universities as they strive to become more sustainable are considerable, even daunting. Yet, with these great challenges come great opportunities for institutions of higher learning to do the things they do best in new and exciting ways. At the University of Maine, this means renewing our commitment to our mission as a Land-Grant Institution and continually creating new ways to deepen and strengthen our engagement with the world outside the walls of the academy. In the words of a significant Kellogg Foundation Report on the future of Land-Grant Institutions, we are called to “return to our roots, becoming once again the transformational institutions we were intended to be.”¹

Despite the fact that the idea of transformational change has become somewhat cliché in recent years, we do not invoke it lightly here. The challenge of guarding against catastrophic climate change and ensuring a high quality of life for Earth’s future residents is a monumental moral imperative that will require transformational societal change in the truest sense. Universities cannot by themselves effect change of this magnitude, but we can deliberately engage both our students and society at large with the goal of deeply embedding the concepts of climate protection and environmental sustainability into the day to day workings of the global economy. By maintaining an overarching institutional focus on climate protection and sustainability in our own research, public policy development, public outreach, and student training, colleges and universities can mount a significant challenge to the widespread but nonetheless specious notion that sustainability is “soft” and generally at odds with “hard” economic development and technological progress.

In fact, institutions of higher education must strive to educate students who are confident and optimistic that they will be the leaders and innovators who finally find ways to incorporate the latest and most exciting findings in natural systems research into our economic and political decision-making framework. If this seems unrealistic, realize that the practical application of esoteric theories related to concepts of supply, demand, and free markets was once considered the purview of ivory-tower academicians. Today, however, no respectable CEO would think to run a company without fundamentally integrating the concepts of modern economics into the company’s management structure. In the future, people will almost certainly wonder how we ever did business without taking account of the physical, chemical, and biological limits of the Earth systems upon which our entire economic system depends. In the words of the aforementioned Kellogg Foundation Report, “We live in an age of transformational, not technical, change. Our leadership, like our institutions, must become transformational as well.”

¹ Returning to Our Roots: Executive Summaries of the Reports of the Kellogg Commission on the Future of State and Land-Grant Universities, National Association of State and Land-Grant Colleges, Washington, DC, January 2001.

UMaine's Response

UMaine is among a select group of colleges and universities that have voluntarily embraced this vision of transformational leadership. On February 9th, 2007, President Robert A. Kennedy signed the American and College University Presidents Climate Commitment (ACUPCC), challenging the University of Maine community to formulate a bold and innovative institutional plan that addresses the looming threat of global climate change. The remainder of this document is devoted to describing the UMaine Climate Action Plan (CAP), which responds to this challenge by proposing a robust planning framework that will assist UMaine administrators, faculty, and students as they work collaboratively to chart a course to a sustainable future grounded in climate protection, economic sustainability, and social vibrancy.

The first part of the plan addresses the need for the kind of deep institutional engagement described above, and is therefore focused on issues of leadership and coordination in the context of the ACUPCC and UMaine's Land-Grant heritage. The second part of the plan addresses the transformational change in university operations and infrastructure that will be required to achieve climate neutrality by bringing our net emissions of greenhouse gases to zero. Although this part of the plan is by necessity more technical than the first, its emphasis is still on general planning principles and performance targets, not on specific projects. In fact, the plan deliberately steers clear of creating an overly prescriptive "master list" of projects that would likely require constant updating and modification over the plan's thirty year implementation period. Instead, it establishes a framework for a holistic decision-making process focused on integrating sustainability-related research at UMaine with campus operations. This framework will enable the judicious and effective selection of specific projects that will move us down the path to climate neutrality.

Ultimately, we hope that this plan will become deeply embedded in the organizational structure of the university, serving as an essential touchstone for a wide variety of campus planning and project implementation decisions for decades to come, and assisting UMaine as it works to set the standard for what it means to be a Land-Grant Institution in the 21st Century.

PART I

Learning, Discovery, Engagement, and Climate Protection at a 21st Century Land-Grant University

The Central Role of Sustainability in the UMaine Learning Community

Sustainability, renewable energy research, and innovation are already important components of the UMaine experience for both undergraduate and graduate students, but we are committed to expanding and improving the sustainability-related learning opportunities that we offer. Our goal is to be a leader in training the next generation of environmental innovators who will be confident in their ability to incorporate the latest and most exciting findings in natural-systems and renewable-energy research into the day to day workings of the global marketplace.

Sustainability in the General Education Core Curriculum

UMaine already has a general education requirement in population and the environment and offers dozens of courses that satisfy this requirement. We also offer numerous majors and minors in areas related to sustainability, most of which offer significant undergraduate research opportunities.

Strengthening Ties with Student Environmental Groups

A variety of student groups are actively working on issues of campus sustainability. The UMaine Office of Sustainability is engaged in a variety of efforts to strengthen the relationship between these groups and the university administration, and to deepen their level of engagement in the climate action planning process. We will work with members of the Green Campus Initiative (GCI), the Green Team, and the University of Maine Sustainability Alliance (UMSA) to improve the overall level of enthusiasm for sustainability on campus and to offer all students an expanded variety of extra- and co- curricular opportunities related to sustainability. We will also collaborate with the Foster Student Innovation Center to highlight the unique promise of sustainability-related innovation in the business world.

Sustainability-Focused Graduate Programs

We are very proud of several new graduate programs that will provide our graduate students with truly exceptional opportunities to become environmental leaders. The Sustainability MBA program has been operating for just over a year and is growing steadily. We are also developing an M.S. degree in Renewable Energy and the Environment, with a focus on deepwater wind energy, as well as a new undergraduate minor in deepwater wind energy. On January 11, 2010, the UMaine Board of Trustees approved a graduate program offering an M.A. in Global Policy (www.spia.umaine.edu/MAinGlobalPolicy), which features a concentration in International Environmental Policy. We are truly optimistic that these unique programs will create a dynamic community of learners and scholars focused on renewable energy, sustainability, and innovation.

An Ongoing Commitment to Sustainability-Focused Research, Discovery, and Innovation

During 2009, UMaine received nearly \$50 million in external funding to support sustainability-related research on campus. In addition to creating practical solutions to contemporary environmental problems in Maine (see description of SSI in the next section), UMaine researchers are working to deepen our understanding of the science of climate change, develop new technologies that will catalyze significant change in the renewable energy industry, and transform energy use at the national and even international levels. We are very excited about the tremendous progress that we have made in this area, and we will strive to strengthen even further our research programs in the areas of climate science, renewable energy, and sustainability in general.

Climate Science

UMaine's Climate Change Institute (CCI) (www.climatechange.umaine.edu) is a world-renowned, interdisciplinary research unit organized to conduct research and graduate education focused on variability of Earth's climate, ecosystems, and other environmental systems and on the interaction between humans and the natural world. CCI's activities extend beyond basic research into education, public outreach, and development of public policy.

Deepwater Offshore Wind Power in the Gulf of Maine

The AEWG Advanced Structures and Composites Center (www.aewg.umaine.edu) has received more than \$25 million in state and federal support for its Ocean Wind Power Initiative. During 2010, the AEWG will build a state-of-the-art facility for the testing and manufacturing of components necessary for the development of next-generation, deep-water offshore wind farms. The AEWG has identified the Gulf of Maine as an excellent site for testing prototypes and developing wind power on a large scale.

Tidal Power

Researchers from a variety of departments at UMaine (e.g., Mechanical Engineering, Marine Sciences) are working with private firms to develop new turbine designs well adapted for tidal conditions in Maine.

Forest Bioproducts Research Initiative (FBRI)

Researchers in the School of Forestry and the Department of Chemical Engineering have developed several techniques for extracting useful biofuels from wood and (with the support of a \$30 million Department of Energy grant) are currently working to commercialize these technologies (www.forestbioproducts.umaine.edu).

Sustainability-Based Public Engagement

As a Land-Grant institution, the University of Maine conducts public outreach and service on an ongoing basis. As a part of this climate action plan, however, we will work towards a model of deeper sustainability-related engagement with the broader university community and the general public. Our primary goal is to make UMaine a vibrant meeting place for both the exchange of ideas and the creation of solutions related to the challenge of global climate change. We are very proud of what we already do, and we look forward to great progress in the following areas.

Cooperative Extension and Sustainable Agriculture

Cooperative Extension (<http://extension.umaine.edu>) engages in a wide variety of outreach activities related to energy conservation education, organic food production, community supported agriculture, and sustainable living, to name only a few. Our Sea Grant (www.seagrant.edu) program is doing excellent work to help Mainers create resilient coastal communities that will be able to adapt to rising sea levels and more severe storms. Through these and other similar programs, we put UMaine expertise to work in communities throughout the state of Maine and provide all Mainers with direct access to the tremendous resources of our institution.

Public Policy

Through the activity of units like the Margaret Chase Smith Policy Center (<http://mcspolicycenter.umaine.edu>) and the Climate Change Institute (CCI), UMaine makes significant contributions to the development of public policy in the state of Maine. In recent years, UMaine has produced influential reports on the potential for renewable energy and efficiency in Maine, as well as a comprehensive assessment of the long-term impacts of climate change on our state. (www.climatechange.umaine.edu/about/reports/climate-future)

Education / Lifelong Learning

In May of 2010, UMaine's Climate Change Institute will offer an innovative course called "Fundamentals of Climate Science." This intensive, twelve day course will be conducted at an off-campus site and is targeted at new graduate students in climate science, advanced undergraduate students, and individuals from all walks of life (e.g. policy-makers, lawyers, insurance professionals, civic leaders, and citizens) with a serious interest in learning more about climate science during a period when the topic has so much importance for our future. We hope to offer more courses like this in the future, and we plan to strengthen our engagement with K-12 educators using a variety of innovative approaches like CCI's Climate Change Science Day (for high school students), as well as online resources such as Science NetLinks.

Stakeholder Engagement

Transforming knowledge into action is an essential part of doing truly meaningful public outreach. UMaine is very fortunate to have received \$20 million from the National Science Foundation's EPSCoR (Experimental Program to Stimulate Competitive Research) to support our new Sustainability Solutions Initiative (SSI). SSI (www.umaine.edu/sustainabilitysolutions) is an interdisciplinary research and outreach program led by UMaine's Senator George James Mitchell Center (www.umaine.edu/waterresearch) that will dramatically affect our state's future. University researchers will work with diverse stakeholder groups from across the state to address problems related to urbanization, forest management, and climate change. This program is most exciting since, in addition to creating practical solutions to environmental problems in Maine, it will support the training of dozens of graduate students and will actually create new models for stakeholder engagement and the transformation of knowledge into action.

PART II

From a Fossil-Fuel Powered Past to a Climate-Neutral Future

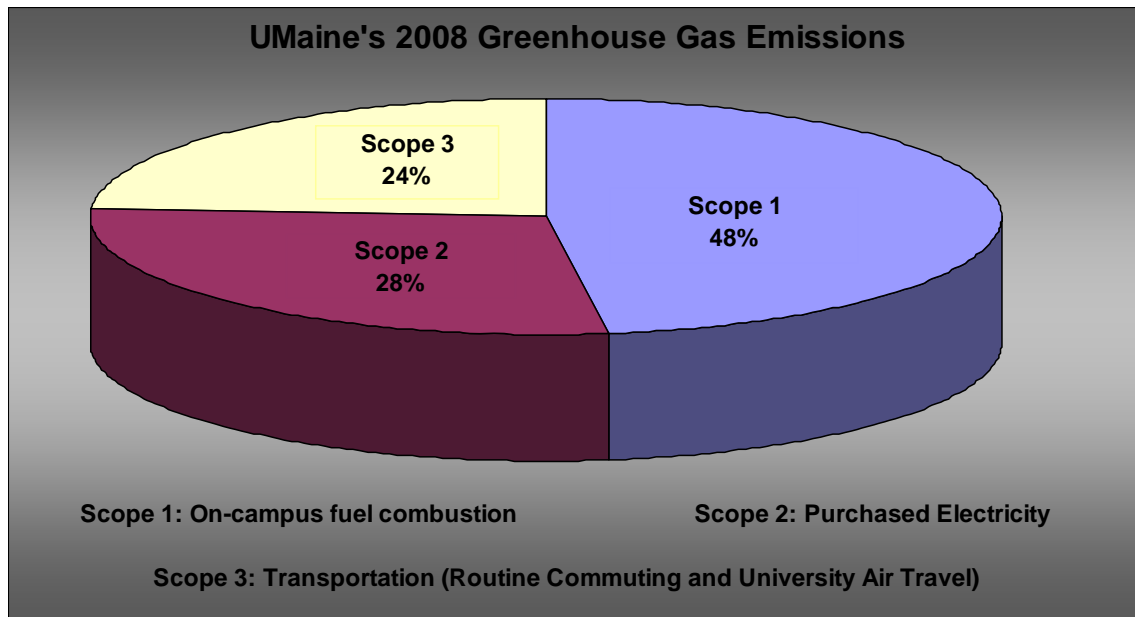
Climate Neutrality by 2040

At first glance, UMaine's commitment to climate neutrality might seem unrealistic since it clearly requires transformational change in institutional operations and infrastructure, dramatic alterations in a variety of personal and institutional behaviors and attitudes, and the kind of sustained planning and implementation effort that few organizations in contemporary society seem willing to undertake.

However, analysis of the history of campus energy use and greenhouse gas emissions (conducted by the UMaine Sustainability Office and the University of Maine Sustainability Alliance) strongly suggests that UMaine can realistically expect to achieve climate neutrality (as defined under the terms of the ACUPCC) by 2040. The remainder of this section describes how we plan to reach this goal.

Greenhouse Gas Emissions at UMaine

In 2008, UMaine's Sustainability Office worked with the student-led University of Maine Sustainability Alliance (UMSA) to conduct a comprehensive inventory of the university's emissions of greenhouse gases. More rudimentary inventories have also been produced for most years going back to 1990 (with significant uncertainty in the data for years before 2000). These inventories take stock of emissions of the six most important greenhouse gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), chlorofluorocarbons (CFCs), and perfluorocarbons (PFCs). Since these gases differ in terms of the heat-trapping potential per ton of gas emitted, total campus emissions are expressed in terms of a common unit: metric tons of carbon dioxide equivalent (CO₂e). In 2008, UMaine's total campus emissions were approximately 71,000 metric tons CO₂e. In keeping with the ACUPCC's approach to performing greenhouse gas emissions inventories, UMaine's emissions are grouped into three general categories, or scopes, as indicated in the following figure.

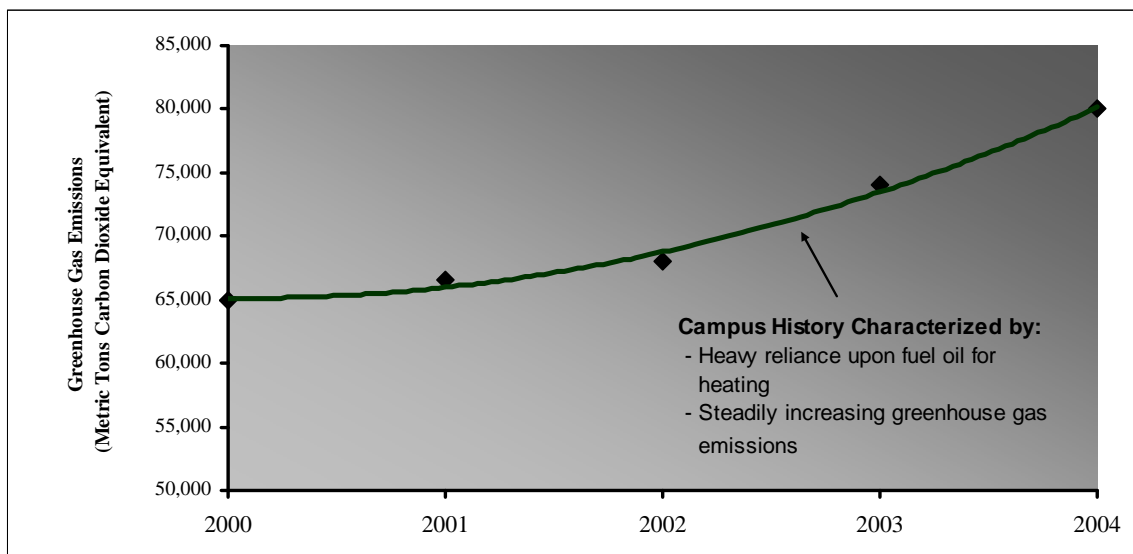


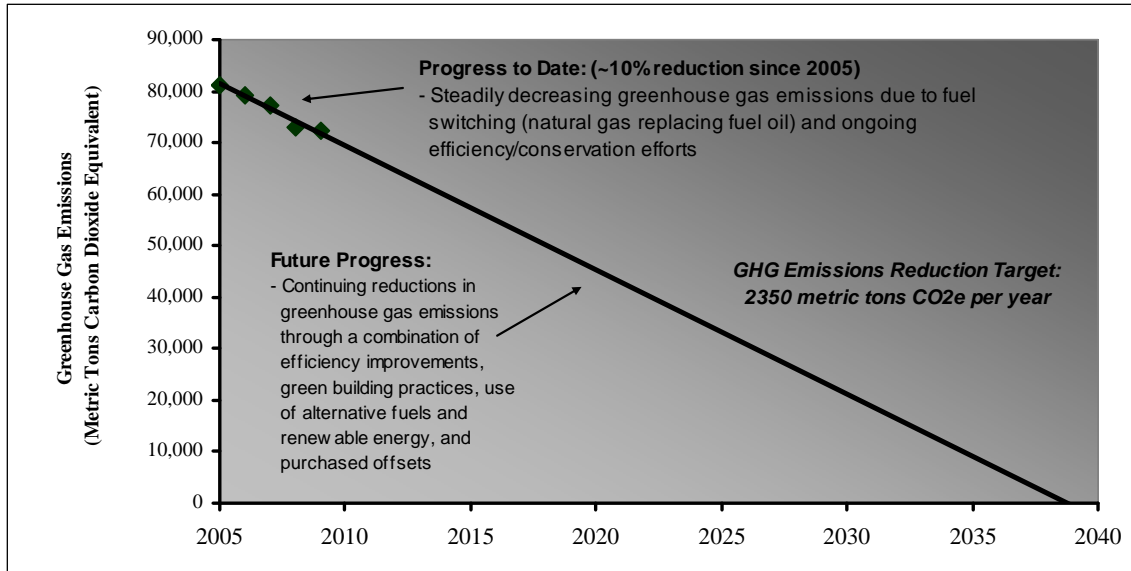
Not surprisingly, nearly half of UMaine's emissions result from the combustion of natural gas, fuel oil, and propane for space and water heating. Nearly 90% of this occurs in the central heating plant, which has therefore become a central focus of our climate action planning efforts. A variety of major improvements to the central plant (including large-scale cogeneration and the use of alternative fuels) are currently under consideration and would produce significant and immediate reductions in greenhouse gas emissions and will likely dominate our near term actions as part of the CAP.

Nonetheless, it is important to remember that just over half of UMaine's campus emissions are due to electricity purchases and transportation. Large-scale cogeneration and use of alternative fuels in the central plant could significantly reduce our emissions associated with electricity, but it is nearly certain that UMaine will always need to buy some quantity of grid-electricity. Thus our ability to achieve climate neutrality will certainly depend upon our success in finding ways to reduce our GHG emissions associated with purchased electricity and transportation. Strategies to do just this are described later in this report.

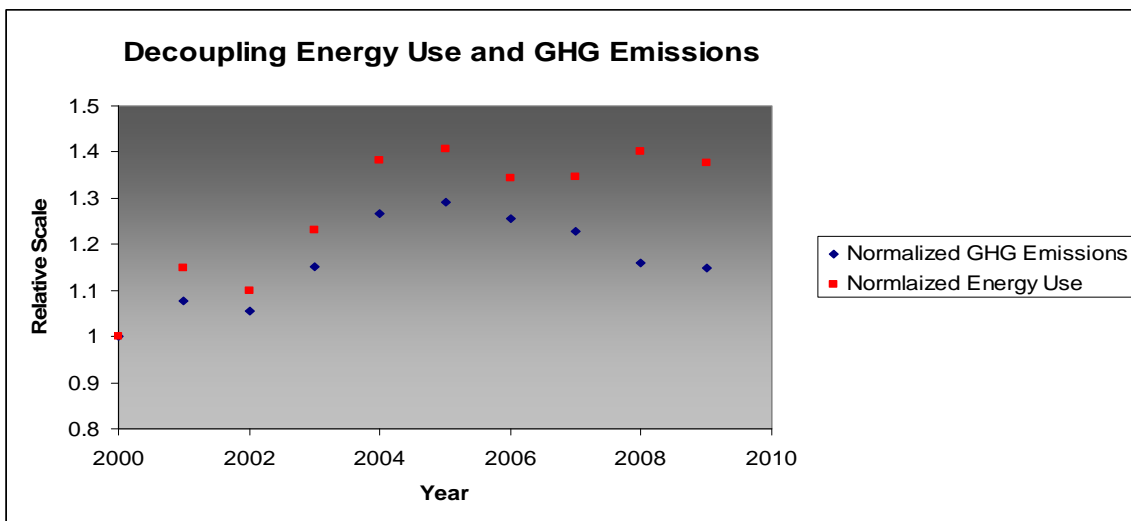
The Path to Carbon Neutrality: Studying the Past to Find a Way Forward

2005 was a watershed year for UMaine in that it marked the end of decades of steady growth in campus greenhouse gas emissions. Since 2005, emissions have been decreasing at the rate of about 2350 metric tons CO₂e per year (approximately 3% per year), almost entirely as a result of fuel switching efforts that have replaced use of #6 fuel oil with use of natural gas in the central heating plant. Although reductions like this will not continue over the long term without significant changes in campus operations and infrastructure (and we are already close to exhausting the possibilities associated with increased use of natural gas), it is nonetheless the basic premise of the UMaine CAP that sustaining an annual rate of decrease in GHG emissions at this level is both technically and financially feasible. In fact, we arrived at our target date for achieving carbon neutrality by extrapolating the trend of the past five years into the future and finding the date when net GHG emissions reach a level of zero. The following figures provide a visual representation of the recent history of greenhouse gas emissions at UMaine and the future that we are resolved to create.





It is widely (and correctly) recognized on campus that recent decreases in GHG emissions are due primarily to fuel switching in the central heating plant. However, deeply ingrained notions about the relationship between GHG emissions and energy use lead to a similarly widespread but fundamentally *incorrect* belief that total campus energy use must be decreasing at least slightly along with the decrease in GHG emissions. In other words, *it is a fixture of conventional thinking that energy use and GHG emissions rise and fall together*. Interestingly enough, evidence shows that this is not necessarily the case, even when fossil fuels serve as an institution’s primary energy input; it will certainly not be true when renewable energy flows dominate our energy supply mix. Indeed, from 2000 to 2005, total energy use and total GHG emissions at UMaine rose and fell in tandem (see below). Since 2006, however, the two have become *decoupled*, with total energy use rising or roughly holding steady while GHG emissions actually fall.



This decoupling is the result of the fuel switching described above, and is therefore not fundamentally surprising. It does, however, challenge certain “common sense” ways of thinking about energy use and GHG emissions and is therefore very important to notice and understand. Furthermore, it is a most desirable trend that we will strive to strengthen by replacing more and more of our fossil fuel inputs with renewable energy flows. More importantly, we will also work diligently to produce a similar decoupling in the relationship between the delivery of energy services (e.g. lighting, heating, cooling, computing, mechanical motion, etc.) and the use of fuels and electricity. This will be accomplished by way of an aggressive program to improve the efficiency of energy use on campus.

Fundamental Principles and Performance Standards: The Core of UMaine’s Mitigation Strategy

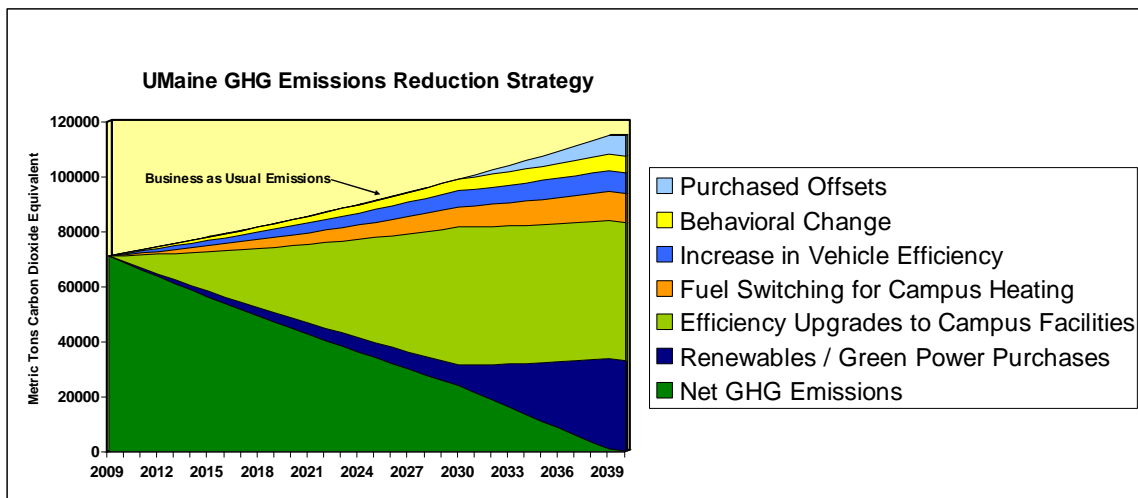
Although the GHG emissions trends described in the previous section are encouraging, it is critical that we recognize that the strategies which we have employed to produce the recent emissions reductions are not, by themselves, sufficient to keep us moving down the path to climate neutrality in a convincing fashion. In fact, if our recent success results in institutional complacency and we return to “business as usual” operations, campus GHG emissions will once again start to climb, and will likely reach a level of nearly 115,000 metric tons CO₂e by 2040. This increase would result from steady growth in total campus energy use (assuming a continuation of the 2% annual growth rate that analysis shows has prevailed over the past twenty years) which itself results primarily from new construction on campus and the continuing proliferation of energy-intensive devices and technologies.

Our ability to achieve climate neutrality by 2040 therefore requires that we develop a mitigation strategy that is clearly up to the task of producing the requisite emissions reductions. As mentioned earlier, we have nonetheless chosen to steer clear of overly prescriptive lists of specific projects and actions that would likely require constant updating and modification over the thirty year implementation period of this plan. In their place we have established three fundamental mitigation principles, as well as six general categories for campus climate initiatives, each of which is associated with specific performance standards. These performance standards were developed by conducting an analysis of historical campus energy use and an assessment of campus energy resources. We are confident that they are realistic and achievable, and that they are not simply wishful thinking. If we hold to these standards (which we feel are sufficiently robust to stand the test of time), we are confident that we can produce the GHG emissions reductions that are necessary to achieve climate neutrality by 2040. The remainder of this section will describe these principles, categories, and performance standards, as well as the GHG emissions reductions that will result if the performance standards are met.

The UMaine Climate Action Plan is based upon three fundamental mitigation principles:

- 1) *Reduction in total campus energy use through highly efficient delivery of energy services, with a focus on decoupling energy service delivery from primary inputs of fuels and electricity.*
- 2) *Replacement of fossil fuel energy inputs with renewable energy flows.*
- 3) *Procurement of emissions offsets to cover whatever remaining emissions reductions are required after the first two strategies have been implemented as aggressively as possible.*

One possible set of mitigation strategies and their corresponding effects on GHG emissions reductions (along with interim milestones) are shown in the following figure. Notice that this is just one possible set of mitigation strategies that are consistent with the plan’s performance standards (listed in the table on the following page). This particular set does not include any significant use of alternative fuels for campus heating (only expanded use of natural gas). Other combinations are certainly possible, including several that involve use of landfill gas or biomass for campus heating. These would produce more dramatic reductions associated with fuel switching, but would result in smaller reductions associated with campus efficiency upgrades.



Interim Emissions-Reduction Target	Target Date	Baseline
20% Reduction in Total Scopes 1, 2, 3 Emissions	by 2015	relative to baseline emissions in 2008
40% Reduction in Total Scopes 1, 2, 3 Emissions	by 2020	relative to baseline emissions in 2008
67% Reduction in Total Scopes 1, 2, 3 Emissions	by 2030	relative to baseline emissions in 2008
100% Reduction in Total Scopes 1, 2, 3 Emissions	by 2040	relative to baseline emissions in 2008

Finally, the following table summarizes the performance standards and emissions reductions associated with each of these mitigation categories.

Mitigation Category	Performance Target	Range of Possible GHG Emissions Reductions (Relative to 2008 Baseline)
Energy Use Reduction Through Highly Efficient Delivery of Energy Services (Including Vehicles and Transportation)	2.5% annual rate of decrease in campus use of energy for heating, electricity, and transportation (50% cumulative reduction by 2040)	17,000 - 35,000 metric tons CO ₂ e
Sustainable Building Design and Construction	As recommended by UMaine’s Master Plan, adopt the Architecture 2030 Challenge to build only carbon neutral buildings after 2030	Significant avoidance of possible future emissions associated with new construction on campus, but no reduction from current emissions
Alternative Fuels for Campus Heating (Fuel Switching)	Dramatically reduce use of fuel oil by 2015 Expand use of natural gas, landfill gas, and gasified biomass	4,000—35,000 metric tons CO ₂ e
Renewable Energy	Purchase (through a green power purchase or RECs) and/or produce (on or near campus) 15—30 million kWh of renewable energy per year by 2030	7,000—14,000 metric tons CO ₂ e
Behavioral Change	10—15 % reduction in demand for campus energy services (including transportation) by 2030	4,000—7,000 metric tons CO ₂ e
Purchased Emissions Offsets	Achieve no more than 30% of GHG emissions reductions using purchased offsets.	5,000—22,000 metric tons CO ₂ e

PART III Moving Forward

Although the emphasis of this report has been on institutional leadership, strategic planning, and measurable performance standards, we would be remiss if we did not spend at least some time describing the many projects that have either contributed to UMaine’s recent success in reducing emissions of greenhouse gases or that will play a significant role in getting us to our goal of climate neutrality in 2040. The following table summarizes these projects.

Project Category	Implemented or in Progress	In Design
Efficient Delivery of Energy Services	<p>Lighting and thermostat upgrades completed in over 80% of rooms in residence halls</p> <p>Energy efficient lighting installed at Alford Arena</p> <p>Continuous commissioning and ongoing system optimization in the 10 most energy intensive buildings on campus</p> <p>Ongoing optimization of fume hood performance in labs across campus</p> <p>Energy efficient low-flow fume hoods installed in Aubert Hall (Chemistry)</p> <p>Window replacement in Aubert and Coburn Halls</p>	<p>Advanced Heat recovery System planned for the Engineering and Science Research Building</p> <p>Researching opportunities to install high-efficiency variable frequency drives to replace aging motors in several energy-intensive campus facilities</p>
Sustainable Building Design and Construction	<p>All significant new campus construction is designed to LEED Silver Standards</p> <p>Four major buildings on campus have received LEED certification</p>	<p>UMaine’s new Campus Master Plan recommends that we adopt the Architecture 2030 Challenge to build only net zero-energy buildings by 2030</p>
Energy Production and Distribution	<p>Since 2005, significant improvements have been made to UMaine’s underground steam distribution system</p> <p>UMaine now operates a 600 kW backpressure turbine in its central heating plant which uses previously wasted thermal energy to produce about 3 million kWh of electricity per year</p>	<p>Facilities Management is currently producing a design basis document for a 5—10 MW combined heat and power (CHP) facility to supply the campus with steam and electricity. In addition to natural gas, landfill gas and biomass are both being given serious attention as potential fuels for this facility</p>
Renewable Energy and Alternative Fuels	<p>Residential-scale solar hot water systems two campus buildings</p> <p>30% of UMaine’s grid-purchased electricity comes from renewable sources</p>	<p>A 500 square foot hybrid solar thermal / PV system is being designed for installation on the roof of Wells Commons</p> <p>A biomass boiler is being considered for the Facilities Management Service Building</p> <p>A large rooftop PV array is being considered for the roof of the Student Recreation Center</p>

Project Category	Implemented or in Progress	In Design
<p>Behavioral Change and Conservation</p>	<p>Only two residence halls remain open during breaks, allowing Auxiliary Services to operate the remaining residence halls at a significantly reduced level of energy use</p> <p>Auxiliary Services has implemented an array of water-saving strategies in residence halls and dining commons, including low-flow shower heads, dual-flush toilets, waterless urinals, and food waste pulpers</p>	<p>Developing a program to train building managers in the fundamentals of energy conservation</p> <p>Developing a strategic energy conservation plan for UMaine’s Memorial Union (the single biggest user of electricity on campus)</p>
<p>Alternative Transportation</p>	<p>In cooperation with the town of Orono and Bangor Area Transit, UMaine operates a free shuttle that connects the campus with downtown Orono</p> <p>All UMaine students and employees ride all BAT buses for free</p> <p>UMaine’s vehicle fleet includes 11 hybrids</p> <p>Parking services offers free permits and preferential parking for carpools, and enforces an anti-idling policy on campus</p>	<p>Researching the opportunity to use waste cooking oil from campus dining facilities to produce biodiesel for use in the campus vehicle fleet</p> <p>Evaluating the feasibility of operating commuter vanpools that would serve a variety of off-campus residential areas</p>

Between these projects and those (which are not yet fully conceived) that we will select and implement using the planning framework described in this document, we are confident that our goal of climate neutrality is realistic, achievable, and ultimately of tremendous benefit to the UMaine community and the State of Maine. Indeed, we are most enthusiastic about our future as a Land-Grant institution rising to the challenge of the ACUPCC in significant and innovative ways.