

2010



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# 2010 Climate Action Plan

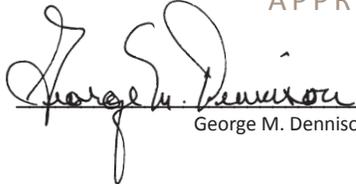


..... The University of Montana .....



# 2010 Climate Action Plan

APPROVED

  
George M. Dennison, President

1-26-10  
Date

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## PRIMARY AUTHORS

**Cherie Peacock, PE, LEED AP**  
*Sustainability Coordinator,  
UM Office of Sustainability*

**Erica Bloom**  
*Sustainability Coordinator,  
ASUM Sustainability Center*

## WITH ASSISTANCE FROM

**Jim Burchfield, Dean, College of Forestry and Conservation**  
**Laura Howe, PE, Assistant Director for Engineering and Utilities**  
**Brian Kerns, PE, Research and Sponsored Programs, Alternative Energy Specialist**  
**Nicky Phear, Adjunct Instructor, College of Forestry and Conservation**  
**Ashley Preston, Adjunct Instructor in Renewable Energy, COT**  
**Steve Schwarze, Associate Professor of Communication Studies**  
**Lisa Swallow, Associate Professor of Business Technology, COT**  
**Tony Tomsu, Program Manager, Office of Planning, Budget, and Analysis**  
**Nancy Wilson, Program Manager, ASUM Transportation Specialist**

## CONTACT

### Office of Sustainability

Facility Services, Building 32 • Missoula, MT 59812 • Phone: 406-243-6001 • Email: [cherie.peacock@umontana.edu](mailto:cherie.peacock@umontana.edu)  
Complete plan available at: <http://www.umt.edu/greeningum/>

# Executive Summary

Leaders of the University of Montana recognize humanity is impacting our climate and are committed to taking action. In 2007, President George Dennison became one of the first 100 charter signatories of the American College and University Presidents Climate Commitment (ACUPCC), pledging the University to reduce and eventually neutralize its greenhouse gas emissions. Determining a timeline and steps to achieve climate neutrality started with the 2008 Greenhouse Gas Inventory and culminates in this Climate Action Plan.

Also in the plan are strategies to incorporate sustainability in education, research, and community outreach. The University of Montana is committed to incorporating sustainability in institutional curriculum in order to create a learning environment that produces ecologically literate and socially responsible graduates.

The UM's Climate Action Plan outlines tactics for achieving climate neutrality by 2020. However, not all of the emission reduction strategies in the diverse portfolio identified are within the funding ability of the University. Overall success of the plan is dependent on obtaining external funding for a few strategies with large emissions reduction potential. Even with this uncertainty, the campus community advocated for the aggressive carbon neutrality date of 2020 to spur deep cuts in emissions quickly.

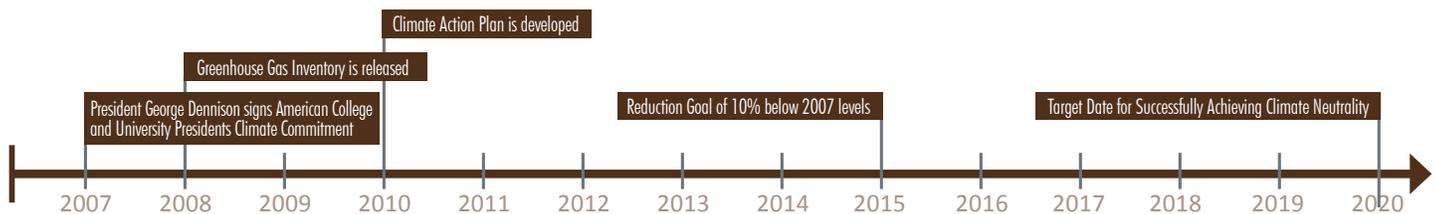
An interim emission reduction goal of 10% below 2007 levels by 2015 was selected based on strategies with foreseeable

funding. It may seem to be a huge leap to then attain carbon neutrality by 2020, but if funding is realized for the larger emission-cutting strategies, this may be achievable.

This Climate Action Plan is just the beginning of UM's efforts to mitigate its contribution to climate change. It is intended to be a living document that is amended as new information becomes available and the success of efforts evaluated. The ACUPCC recognizes the rapidly changing situation surrounding climate change mitigation and accommodates updates to plans at any time.

Completing this Climate Action Plan was undertaken as a community effort. A public involvement process was designed and implemented through public meetings, internet social networking, stakeholder meetings, media announcements, and an all-campus survey. Ideas to reduce greenhouse gas emissions were collected and analyzed using the Clean Air-Cool Planet Campus Carbon Calculator.

Through the planning process, awareness of how UM operations affect our environment has increased and relationships developed that will foster the greening of UM. These are some of the benefits of a people-intensive planning process that will be vital to the success of UM's efforts to become climate neutral.



# Acknowledgements

Many people offered ideas, technical assistance, and logistical support in the development of The University of Montana's first Climate Action Plan. We are grateful to everyone who participated in open houses, surveys, meetings, and conversations that led to new ways of thinking about the challenges of climate change. The dedication and insight of the Technical and Education Working Groups, input from the Sustainable Campus Committee, departments, and members of the Missoula community, as well as the passion of students, particularly members of UM Climate Action Now, made this plan a community effort. The spirit of collaboration that emerged through this planning process will be integral to its successful implementation.

## Technical Working Group:

**Erica Bloom**  
**Jim Burchfield**  
**Laura Howe**  
**Brian Kerns**  
**Cherie Peacock**  
**Ashley Preston**  
**Tony Tomsu**  
**Nancy Wilson**

## Education Working Group:

**Erica Bloom**  
**Nicky Phear**  
**Steve Schwarze**  
**Lisa Swallow**

## Sustainable Campus Committee

*(past and present members involved with the plan):*

### Students:

**Lindsay Becker**  
**Erica Bloom**  
**Jessie Davie**  
**Whitney Hobbs**  
**Derek Kanwischer**  
**Patrick Rhea**

### Staff:

**Kelly Chadwick**  
**Dan Corti**  
**Brian Kerns**  
**Mike Panisko** *(Co-Chair)*  
**Paul Williamson**

### Faculty:

**Phil Condon**  
**Curtis Noonan**  
**AmyRatto-Parks**  
**Robin Saha**  
**Lisa Swallow**

### Administration:

**Chris Comer**  
**Charles Couture**  
**Mark LoParco**

### Office of Sustainability:

**Cherie Peacock** *(Co-Chair)*

### Executive Officer Oversight:

**Robert Durringer**, *Vice President for Administration and Finance*

## Technical Experts and others involved:

**Dave Atkins**, *US Forest Service Fuel for Schools Program*  
**Mike Burke**, *UM Steam Plant Manager*  
**Jameel Chaudry**, *UM Architect/Project Manager*  
**Ann Cundy**, *Transportation Planner, Missoula Office of Planning and Grants*  
**Tim Daniel**, *Computer Support Specialist III, Administration & Finance*  
**Bob Giordano**, *Missoula Institute for Sustainable Transportation*  
**Anne Guest**, *Parking Commissioner*  
**Hugh Jesse**, *Director, UM Facilities Services*  
**Louise Lakier**, *LEED AP, UM Project Manager*  
**Ingrid Lovitt**, *Architect, LEED AP, Design Balance*  
**Lee Tavenner**, *Renewable Energy Specialist, Solar Plexus*  
**Ben Schmidt**, *County Health Air Quality Program*  
**Janelle Stauff**, *Renewable Energy Specialist, Sunelco*  
**Alex Stockman**, *Director of Missoula In Motion*  
**Phil Smith**, *City Bike Pedestrian Coordinator*  
**Alex Taft**, *Missoula Advocates for Sustainable Transportation*  
**Alex Zimmerman**, *UM Mechanical Engineer*  
**Members of UM Climate Action Now student group**  
**Members of UM FLAT** *(Forum for Living with Appropriate Technology)*  
**Members of MontPIRG**

## Greenhouse Gas Inventory Team and Report Contributors:

**Jessie Davie**, *ASUM Sustainability Coordinator*  
**Erika Fredrickson**, *UM Student*  
**Kendra Kallevig**, *UM Student*  
**Sky Orndoff**, *UM Student*  
**JJ Vandette**, *UM Student*  
**Phil Condon**, *Associate Professor, EVST, Faculty Advisor*

# Introduction

## Commitment to Climate Action

Montanans are becoming increasingly aware of the effects of a global climate change manifesting in local environments. The University of Montana – Missoula, situated in an area characterized by river valleys and forested mountains intermingled with open grasslands, is located in an ecosystem that evolved with wild fires. Although fire is a natural part of this system, the number of acres burned and the intensity of wildfires have increased in the Rocky Mountain west in recent years. While ecosystem dynamics are inherently complex, some scientists believe this altered wildfire pattern is due in part to our changing climate.<sup>1</sup>

Increasing forest fire activity is not the only consequence of climate change visible to Montanans. Glaciers of Glacier National Park are retreating, river flow patterns are changing, and the overall temperature is increasing.<sup>2</sup> These changes correspond to increases in global average air and ocean temperatures as documented in the Climate Change 2007: Synthesis Report by the Intergovernmental Panel on Climate Change (IPCC). A quote from this report adds context to these changes, “Average Northern Hemisphere temperatures during the second half of the 20th century were very likely higher than during any other 50-year period in the last 500 years and likely the highest in at least the past 1300 years.”<sup>3</sup>

Modern industrial activity, especially the use of fossil fuels, also corresponds to rising global temperatures. Again from the IPCC, “Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [human-caused] GHG [greenhouse gas] concentrations.”<sup>4</sup>

Leaders of the University of Montana (UM) recognize humanity is having an impact on our climate and are committed to doing something about the University’s contribution. In 2007, President George Dennison signed the American College and University Presidents Climate Commitment (ACUPCC) committing UM to develop an institutional climate action plan to become climate neutral. This means having no net greenhouse gas (GHG) emissions. Climate neutrality can be achieved by minimizing GHG emissions as much as possible and using carbon offsets or other measures to mitigate the remaining emissions. The ACUPCC also requires Climate Action Plans include strategies to incorporate sustainability in education, research, and outreach.

To comply with the ACUPCC, UM’s first Greenhouse Gas Inventory was completed in 2008 and the Office of Sustainability with a full-time director was formalized in 2009. Prior actions included the development of the Sustainable Campus Committee in 2002 and signing the Talloires Declaration that same year.

Completing this first Climate Action Plan identifying greenhouse gas emission reduction strategies was undertaken as a community effort through public involvement, input from the Climate Action Planning Technical and Education Working Groups, and oversight by the Sustainable Campus Committee. Previous efforts of the Sustainable Campus Committee, Facility Services Sustainability Initiatives Team, ASUM Sustainability Center, and the Recycling Oversight Committee paved the way to institutionalize sustainability in campus operations, research, teaching, and service/outreach functions.

## Methods

### Climate Action Plan Development Process

Completing this Climate Action Plan was undertaken as a community effort. A public involvement process was designed and implemented through public meetings, internet social networking, stakeholder meetings, media announcements, and an all-campus survey. Ideas to reduce greenhouse gas emissions from campus operations were collected and analyzed using the Clean Air-Cool Planet Campus Carbon Calculator, version 6.4. Estimates were based on best guesses, not detailed engineering analysis. Strategies were prioritized and a timeline developed to establish emission reduction interim goals and a target date for carbon neutrality. A draft plan was made publically available for review and comments incorporated in the final plan in as much as possible.

The Climate Action Plan was coauthored primarily by UM’s Sustainability Coordinator and ASUM’s Sustainability Coordinator with input from a Technical Working Group that met every two weeks during plan development. Technical Working Group members included campus professionals and local topic experts were occasionally invited. An Education Working Group convened

to write the section of the plan detailing goals and strategies to incorporate sustainability in curriculum, research, and community outreach. The Sustainable Campus Committee made up of staff, students, faculty, and administrators provided guidance and served as advisory authority. University Executive Officers were the final decision making authority.

A spirit of collaboration emerged though development of UM’s first Climate Action Plan. This will be a key component of its successful implementation.

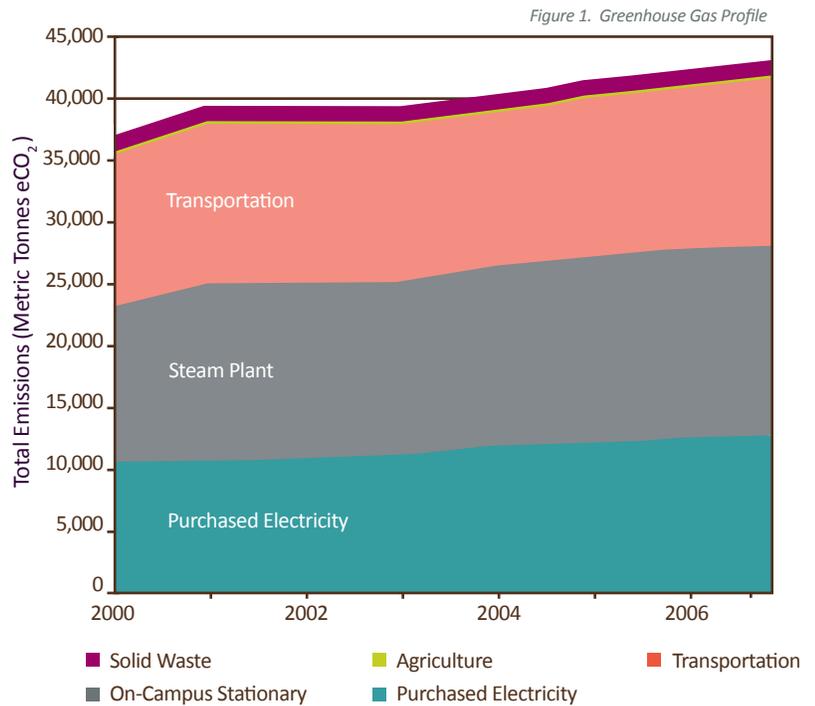


# Greenhouse Gas Emissions

## Greenhouse Gas Profile

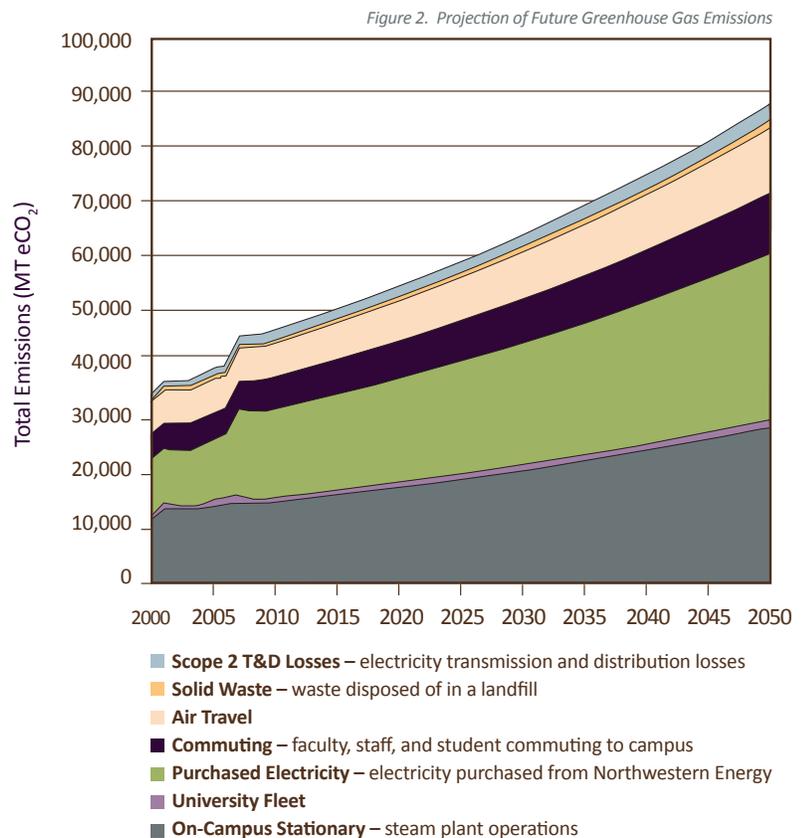
In 2008, a Greenhouse Gas (GHG) Inventory was completed that identified UM's primary sources of emissions as well as a steadily increasing trend due to growth.<sup>5</sup> The inventory was completed using Clean AirCool Planet Campus Carbon Calculator, version 5. On-campus production of steam (On-campus stationary) for heating buildings is the highest contributor with 36.1% of total campus emissions. Close behind is transportation which accounts for 31.6% of total emissions. Transportation includes air travel, commuting, and University fleet. The third highest emitter is purchased electricity used to power buildings and other campus operations which makes up 30.8%. The inventory revealed that the operation of buildings on campus contributes 2/3 of the emissions attributed to UM.

The graph to the right shows a breakdown of the largest emission sources and includes emissions from solid waste and agriculture - a term used to describe the maintenance of campus grounds. The line indicating emissions due to agriculture is just below solid waste but is difficult to pick out on the graph to the right. Although grounds maintenance and the decomposition of solid waste contribute greenhouse gas emissions, their part is small in comparison to the other sources. Due to time constraints, they were not dealt with in detail in this first Climate Action Plan.



## Business as Usual

Energy consumption for building-related infrastructure results in the largest climate impact attributed to the University of Montana. This energy comes from a mix of natural gas and purchased electricity and is used for heating, cooling, hot water, lighting, and to power computers, appliances, and equipment. Directly reducing energy consumption in existing buildings will decrease UM's overall carbon footprint. However, adding new buildings would counteract that reduction. The Greenhouse Gas Inventory found a steadily increasing trend in emissions since 2000 that correlated to increasing student enrollment and construction of new buildings. If this rate of increase is projected into the future, the resulting greenhouse gas emissions, measured in metric tonnes of carbon dioxide equivalent (MT eCO<sub>2</sub>), will increase correspondingly as shown in the graph to the right. This graph includes projections for air travel, commuting, solid waste disposal and University fleet along with emissions attributed to buildings and equipment.



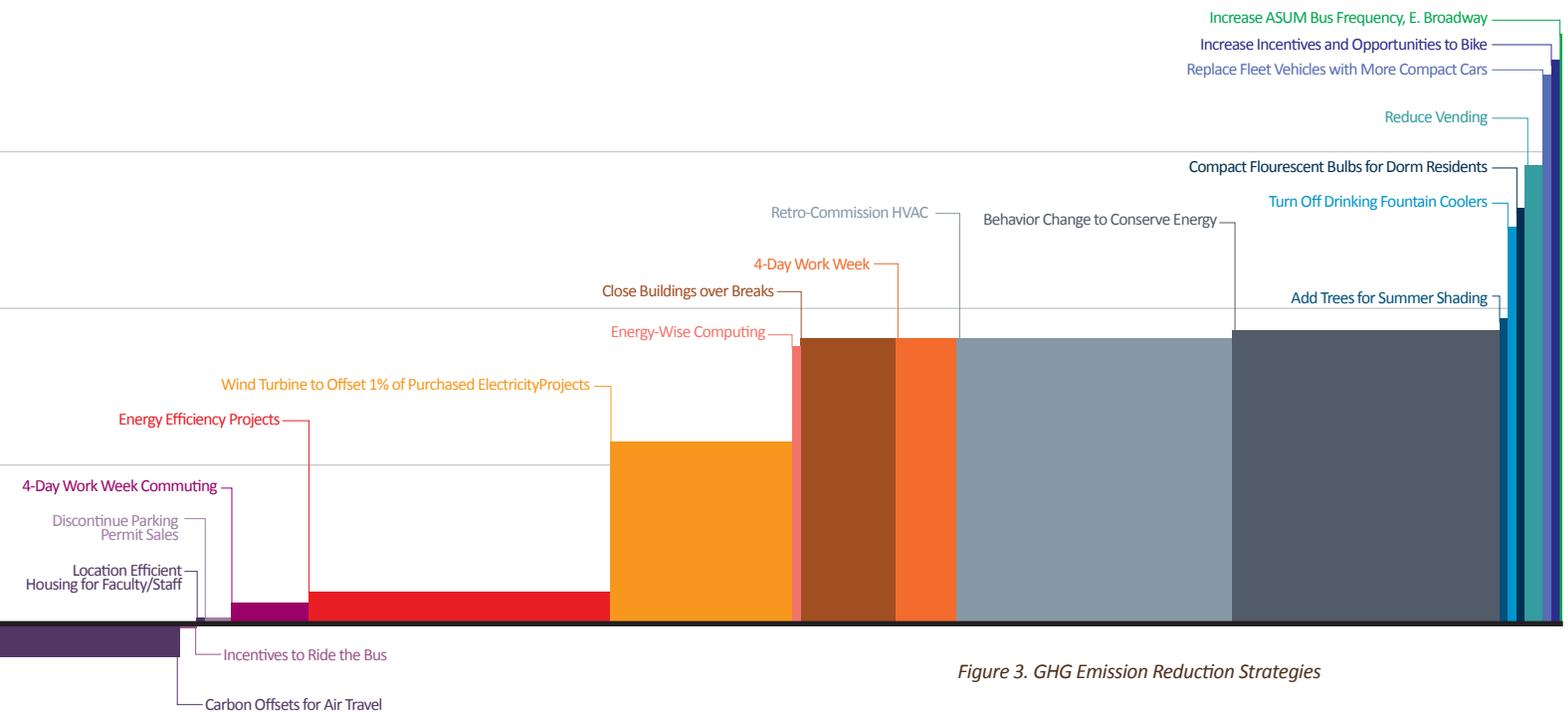


## Strategy Evaluation

The GHG emission reduction strategies listed on these pages were analyzed using the Clean Air-Cool Planet Campus Carbon Calculator version 6.4 and compared using the bar graph above. The graph displays the annual amount of GHG reduction in metric tonnes of carbon dioxide equivalent (MTeCO<sub>2</sub>) per strategy along the horizontal axis and the annual cost or savings per MTeCO<sub>2</sub> reduced along the vertical axis. The width of the bar is relative to the quantity of eCO<sub>2</sub> reduced. The height of the bar, either above or below the x-axis, displays the relative

cost (negative) or savings (positive). The strategies are listed in order of greatest costs (left) to greatest savings (right). Please note that some bars are difficult to see because of their relative greenhouse gas emission reduction is small. The benefit of the bar graph is that it helps to see which strategies should be highest priority for implementation to achieve the greatest reduction in greenhouse gas emissions and the relative cost per MT eCO<sub>2</sub>.

# Reduction Strategies



## Greenhouse Gas Reduction Strategies

Many ideas for greenhouse gas emission reduction strategies were identified through the climate action planning public involvement process. A complete list is included in the full-text Climate Action Plan. The comprehensive list was narrowed and categorized as outlined below:

### • Energy Efficiency and Conservation

- Energy efficiency upgrades to existing buildings
- Lighting retrofits
- Behavior change to conserve energy
- 4-day work week
- Reduce building energy consumption over breaks
- Retro-commissioning (optimize operation of heating, air conditioning, and ventilation systems)
- Reduce vending
- Turn-off drinking fountain coolers
- Provide compact fluorescent light bulbs for on-campus residents' task lighting
- Energy-wise IT
- Trees for summer shading

### • Renewable Energy Generation

- Biomass Plant On-Campus
- Solar - photovoltaic
- Solar thermal – Grizzly Pool
- Wind

### • Green Buildings

- Leadership in Energy & Environmental Design (LEED) certification for new construction

### • Transportation

- Staff, Faculty, and Student Commuting
  - Promote more bus options
  - Increase incentives and opportunities to bike or walk to campus
  - Implement a parking management plan
  - Promote community housing plans within the urban core
  - Implement a 4-day work week
- University Fleet
  - Replace fleet vehicles with more compact cars
  - Replace some fleet vehicles with hybrid cars
  - Find a source for biodiesel for the ASUM buses
- Air Travel
  - Purchase high quality Carbon Offsets

### • Offsetting Emissions

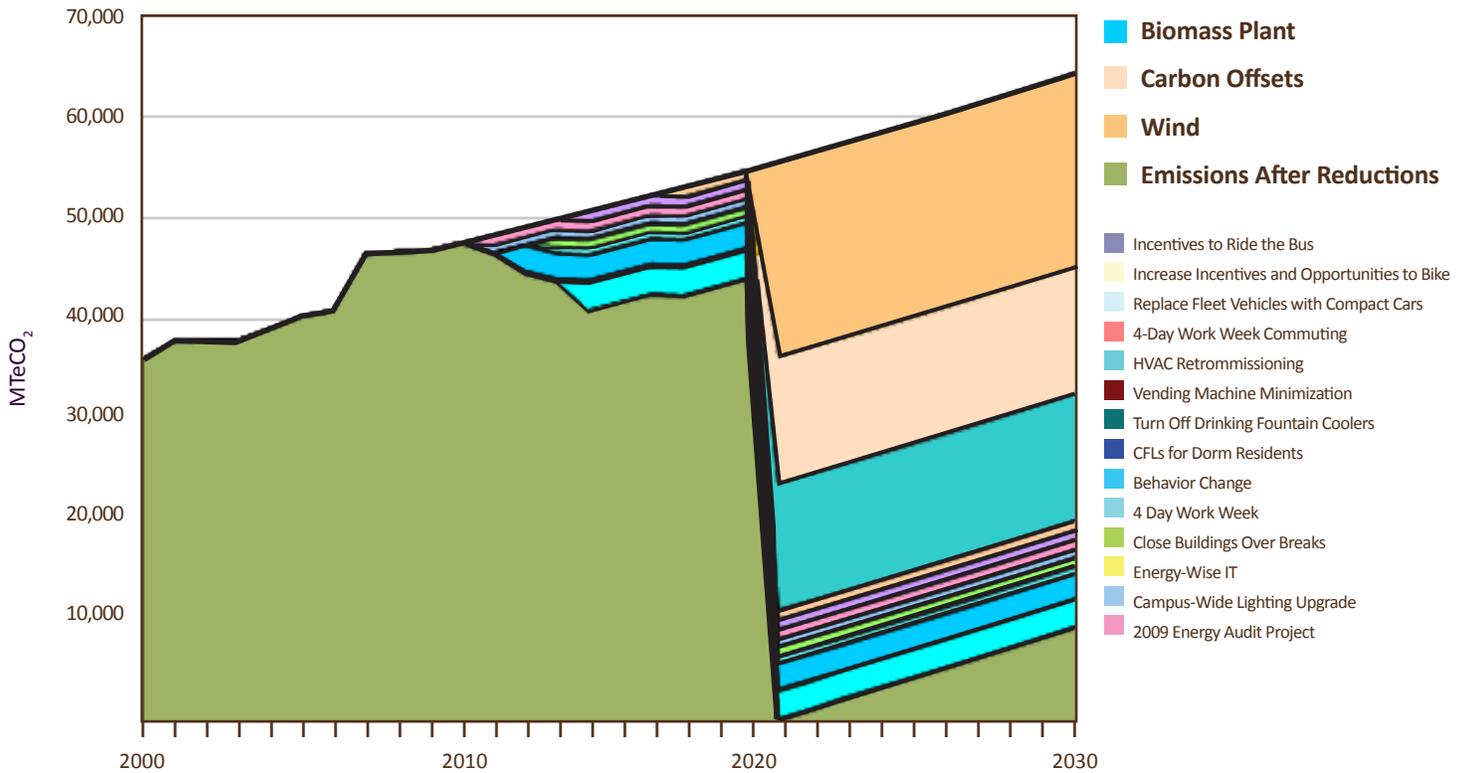
# Targets and Goals

## Climate Neutrality Target

When President Dennison signed the American College and University Presidents Climate Commitment, he pledged UM to achieve climate neutrality as soon as possible. This, as it turns out, is no easy task and these initial efforts are just the beginning. Any plan with a long time frame is due to be upset by unforeseen circumstances. The process of refining goals to achieve climate neutrality will be ongoing as new information becomes available and the success of efforts evaluated. In fact, the ACUPCC recognizes the need for revisions and accommodates updating Climate Action Plans at any time. The goals set forth herein mark the path toward a zero carbon footprint campus and point the University in the right direction to reduce its impact on our climate.

Public feedback indicated strong support for an aggressive carbon neutrality date and UM's Climate Action Plan (CAP) outlines strategies for achieving climate neutrality by 2020. However, not all of the emission reduction strategies in the diverse portfolio identified are within the funding ability of the University. Overall success of the plan is dependent on obtaining external funding for a few strategies with large emissions reduction potential. Even with this uncertainty, the campus community advocated for the aggressive carbon neutrality date of 2020 to spur deep cuts in emissions quickly. Below is a graph showing how carbon neutrality could be achieved by directly reducing energy consumption (the small wedges not labeled) and incorporating renewable sources of energy such as biomass and wind. Some system of offsetting carbon, either projects or purchasing, would be used to decrease remaining emissions not otherwise reduced.

Figure 4. Carbon Neutrality Graph



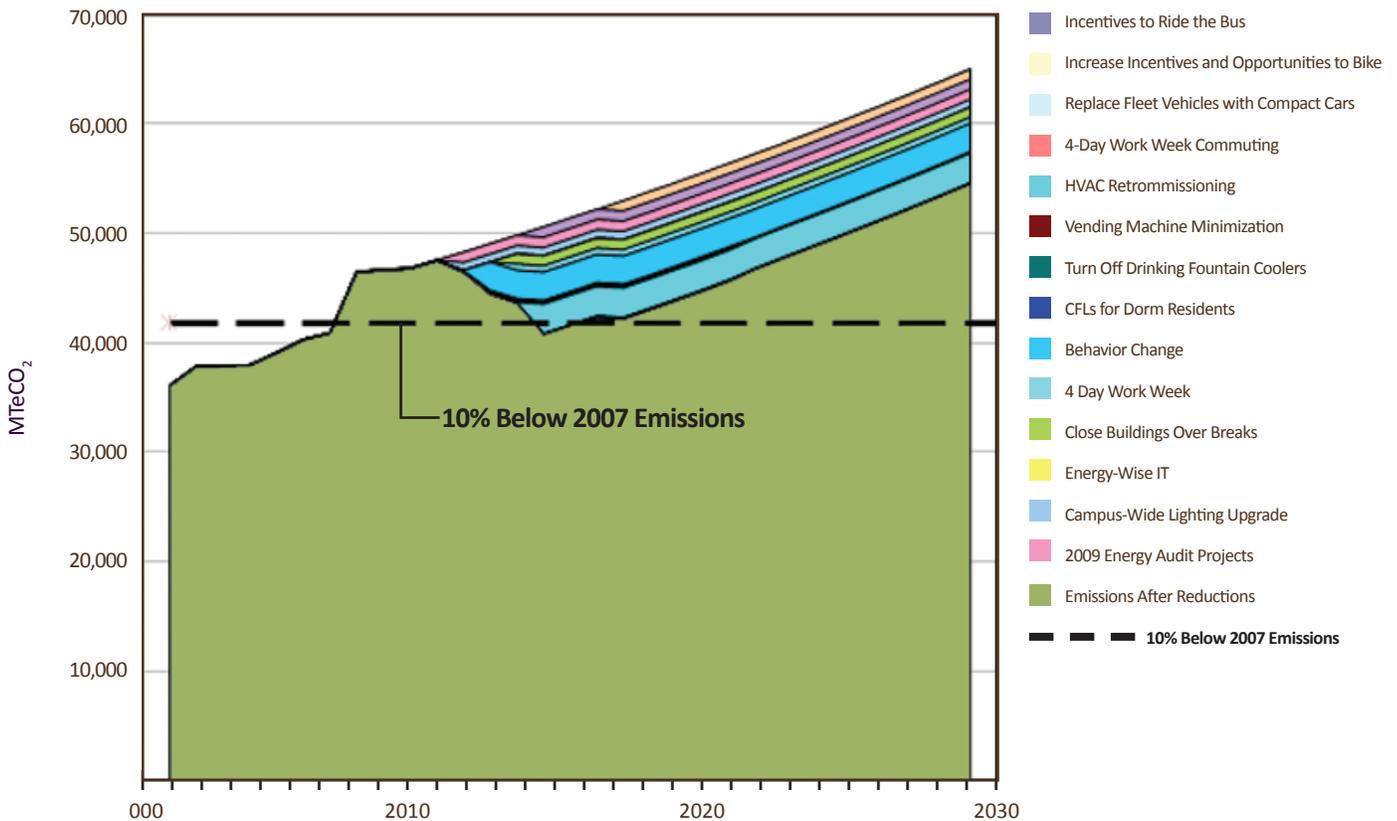
# Targets and Goals

## Interim Goals

Interim goals are as important, if not more so, than a carbon neutrality target date. Interim goals are short term, provide the opportunity to measure progress, and encourage starting the downward trend toward carbon neutrality as soon as possible. An interim emission reduction goal of 10% below 2007 levels by 2015 was selected based on implementable strategies with foreseeable funding. It may seem to be a huge leap to then attain carbon neutrality by 2020, but if funding is realized for the larger emission-cutting strategies, this may be achievable.

To determine a reasonably aggressive interim goal, the energy efficiency, conservation, and alternative transportation emission reduction strategies were plotted on the Business as Usual graph. These strategies were chosen for priority implementation because they are mostly within the University's ability to fund. Graphing results are shown below and indicate an interim target of 10% below 2007 emission levels by 2015. It is difficult to correlate the legend to the graph but it does show a list of strategies included and the overall emission reductions achieved.

Figure 5. Interim Goal Graph



# Sustainability in Education, Research, and Community Outreach

## Education, Research, and Outreach

The ACUPCC emphasizes the importance of incorporating sustainability in institutional curriculum in order to create a learning environment that produces ecologically literate and socially responsible graduates. The University's commitment to the educational component of the ACUPCC is delineated in UM's strategic plan as follows:

*Goal #2 of UM's Academic Strategic Plan states "Create a campus climate that actively supports sustainability, including environmental responsibility, sustainable operations, and stewardship in our community".*

Directed by the ACUPCC and the Academic Strategic Plan, and spearheaded by a subcommittee of UM's Sustainable Campus Committee, the following broadly identified goals and potential strategies for attaining them have been developed.

## Goals/Strategies

**Goal:** Establish Sustainability and Climate Change as recognized, emphasized, and common themes across the University curriculum. In order to achieve this goal, UM should consider the following strategies:

- Offer Green Thread or other initiatives on a regular basis to help faculty integrate sustainability into existing courses
- Develop a plan for all students to encounter sustainability education
- Develop a network of faculty (at least one per department) to promote sustainability pedagogy across campus
- Increase number of relevant courses to create a "sustainability track" in General Education
- Create a Sustainability Literacy Assessment similar to Writing Proficiency Assessment

**Goal:** Make Sustainability and Climate Change a center of academic excellence for the University. In order to advance this goal, UM may:

- Establish new faculty lines to support sustainability areas in Environmental Studies (EVST) and Climate Change Studies minor
- Engage in strategic hiring in other departments and programs to strengthen sustainability and climate change as a focus
- Facilitate opportunities for innovative research and teaching across departments, with the College of Technology (COT), and with other sectors of the University

**Goal:** Supplement formal education on sustainability and climate change with informal, practical, and career-oriented education that enhances relationships between UM and community partners. In order to advance this goal, UM may:

- Support service-learning and project-oriented pedagogy that makes UM a more sustainable member of the community
- Make sustainability and climate change prominent features of orientation, residence hall programming
- Make sustainability and climate change prominent features of UM events and programs that attract off-campus participants (public lectures, extracurricular activities, alumni events, athletic events, etc.)
- Strengthen relationships with external organizations for internships and work-based learning
- Develop new funding streams to support expanding the COT Energy Technology program

# Sustainability in Education, Research, and Community Outreach

## Ongoing Programs

The University of Montana implemented several noteworthy programs that further sustainability in education, research, and community outreach. Following is a partial list of established activities that puts UM well on its way to achieving the goals stated on the previous page.

- Education and Curriculum
  - The Green Thread faculty development workshop for incorporation of sustainability in curriculum
  - Sustainability Areas of Study in the Environmental Studies Program
  - Climate Change Studies minor - one of the nation's first undergraduate interdisciplinary minors in Climate Change Studies
  - UM's COT AAS degree in Energy Technology
  - School of Journalism Master's Degree in Environmental and Natural Resource Journalism
  - Sustainability in WRIT 101 classes
  - Campus Climate Exchange and Focus the Nation one day sustainability "teach-in" held each year
  - Public Lecture Series – Continuing the Climate Change Dialogue
- Research
  - Greenhouse Gas Inventory student involvement and research
  - Revolving Energy Loan Fund organized and managed by students
  - A wide variety of faculty and student research emphasizes sustainability
- Community Outreach
  - The Forum for Living with Appropriate Technology (UM FLAT) - an experiential live-in resource for students to learn about sustainable living
  - Green Griz athletic events
  - Farm-to-College local food program
  - Climate Change internships, practicum, and field-based learning
  - Community outreach component of the Environmental Citizenship course
  - Service Learning component of the Sustainable Business Practices course
  - COT Energy Technology program outreach and field work



# Conclusion

## Next Steps

To implement this Climate Action Plan, the strategies identified will need to be prioritized, funded, and assigned for further action. The Technical Working Group used best available data to develop the GHG reduction scenarios but there is great uncertainty as to what might be possible in the future. Detailed engineering analyses are needed to determine the most cost-effective ways to implement this plan. Teams will need to be convened to research wind power, biomass energy generation, funding, and carbon offsetting options. The Sustainable Campus Committee, with the support of the Office of Sustainability, will monitor and report on progress as well as recommend future updates and revisions to the Climate Action Plan.

An important outcome of the planning process has already been achieved. Awareness of how UM's operations affect our environment has increased and relationships developed that will foster the greening of UM. These are some of the benefits of a people-intensive planning process that will be vital to the success of UM's efforts to become climate neutral.

## Endnotes

<sup>1</sup>Steven W. Running, "Climate Change: Is Global Warming Causing More, Larger Wildfires?" *Science*, 313 (2006), 927-928.

<sup>2</sup>**U.S. Geological Survey.** (2008, July 25). *Northern Rocky Mountain Science Center*. Retrieved October 28, 2009, from NORock: [http://nrmssc.usgs.gov/research/glacier\\_retreat.htm](http://nrmssc.usgs.gov/research/glacier_retreat.htm)

<sup>3</sup>**Intergovernmental Panel on Climate Change,** *Climate Change 2007: Synthesis Report. Summary for Policymakers.*

<sup>4</sup>**Intergovernmental Panel on Climate Change,** *Climate Change 2007: Synthesis Report. Summary for Policymakers.*

<sup>5</sup>Jessie Davie, "GHG Inventory". 2008.



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