

President's Climate Commitment Action Plan Western State College of Colorado, September 2009

Introduction

As expressed in its institutional mission, Western State College of Colorado graduates “citizens prepared to assume constructive roles in local, national, and global communities.” In June of 2007, in an action consistent with Western’s mission, President Jay Helman signed the President’s Climate Commitment (PCC). The PCC commits Western to becoming a “carbon neutral” campus. Inspired by Western students who encouraged signing of the PCC, this commitment challenges Western to examine how citizens “assume constructive roles” in the context of climate change. In signing the PCC, the President recognized that our “local” choices in powering and educating our campus community obligate us to “global communities” facing the consequences of our carbon emissions.

At Western, a college high in the Rocky Mountains, our obligation to the climate crisis is elevated for regionally unique reasons. Gunnison’s cold weather and remote location currently create the demand for unsustainable levels of fossil fuels to heat homes and transport food, staples and luxuries. Climate change could hinder this region’s distinctive mountain economy. Colorado College’s 2006 State of the Rockies Report Card predicts that, if carbon emissions are not reduced dramatically, Gunnison County could lose 43 percent of its snowpack this century. Gunnison offers unique opportunities for potential climate solutions with renewable energy resources of sun, biomass and wind. And finally, faculty and community expertise on energy efficiencies and student enthusiasm for implementing local and global solutions emerge from this exceptional place.

Western’s 2004-2009 Academic Strategic Plan recognizes the importance of the College being “a leader in resource efficiency” and its role in exemplifying and providing solutions for the “often competing forces of economic development and environmental stewardship.” As a regional educational provider, Western can model the importance of generating financial savings from natural resource savings. Furthermore, the PCC promises to spark interdisciplinary, hands-on learning opportunities for students and pedagogical innovation for faculty.

An ad hoc President’s Climate Committee was formed in July of 2007 and charged with three tasks: recommend two tangible actions from the Presidents’ Climate Commitment to the cabinet for possible implementation by 2009; conduct a baseline survey of Western’s greenhouse gas emissions; and develop a draft PCC Action Plan for cabinet and campus community consideration. Committee membership included three faculty, two students, the director of residence life, associate vice presidents of academic affairs and student affairs, the facilities operation manager, and the campus controller. The Committee completed its work in January 2009 when it submitted a draft PCC Action Plan to the president.

During the spring of 2009, the College’s newly formed Sustainability Action Committee (SAC) sought broader campus input on the draft Action Plan and then prepared recommendations for the cabinet.

This Action Plan includes a survey of greenhouse gas emissions from 1998 through 2007, possible mitigation and educational strategies to achieve carbon neutrality by an ambitious and realistic timeline, and a financial analysis of the costs and benefits of different mitigation strategies. This plan is consistent with Western’s Environmental Charter, 2004-2009 Academic Strategic Plan, and role and mission.

Timeline and goals

The goal of carbon neutrality is an ambitious one for Western. For the purpose of Western’s plan, carbon neutrality is defined as having reduced or offset all direct and indirect emissions generated by electricity and natural gas use by the College’s physical plant and combustion of fossil fuels by institution-owned/controlled vehicles. During the first five years of the plan, we will create an institutional structure to implement education and mitigation principles, measure our progress toward reducing CO₂ emissions, and we will adapt our plan as new technologies and opportunities avail themselves. Our targets are a reduction of 20 percent from campus 2006 CO₂ emissions by 2020, a 50 percent reduction by 2035, and carbon neutrality by 2050. Our baseline data suggest that without action, we will continue to release more than 11,000 tons of carbon each year. Realistic progress will only be achieved through the creation of a campus culture that values the endeavor and through commitment to education and mitigation principles underlying a successful transformation.

Campus emissions

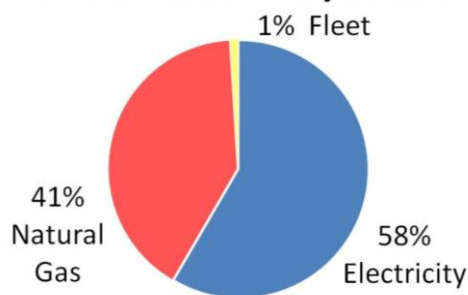
A requisite first step toward carbon neutrality is developing a baseline inventory of greenhouse gas emissions. The PCC encourages campuses to use a tool called the Clean Air Cool Planet Campus Carbon Calculator, which is consistent with the Greenhouse Gas Protocol (GHG) used internationally by businesses and governments to set baseline calculations for their endeavors. Signatories of the commitment are expected to provide baseline data for GHG emissions from direct emissions generated by electricity and natural gas use by the institution and mobile combustion of fossil fuels by institution-owned/controlled vehicles. Additional data for indirect sources of emissions that are a consequence of the activities of the institution, but not sources owned or controlled by the institution, are encouraged where possible (e.g., food transport, air travel, etc.). While only one year of baseline data is required, the College has created a baseline inventory from 1998 through 2006. Such a baseline allows comparison of Western's emissions prior to a major change in 1999 to our boiler systems, which use natural gas to heat buildings and water on the campus. Data on actual electricity and natural gas use were gathered for each of the eight years while information on travel emissions was collected for 2006 only and projected to be similar through the period of our survey.

Our baseline clearly illustrates that the most significant contributors toward Western's greenhouse gas emissions are electricity and natural gas use. Natural gas and electricity account for more than 99 percent of our emissions and over 11,000 tons of CO₂ released each year (see figures). The number one priority for Western is to create mitigation measures which reduce or replace electricity and natural gas use in our buildings.

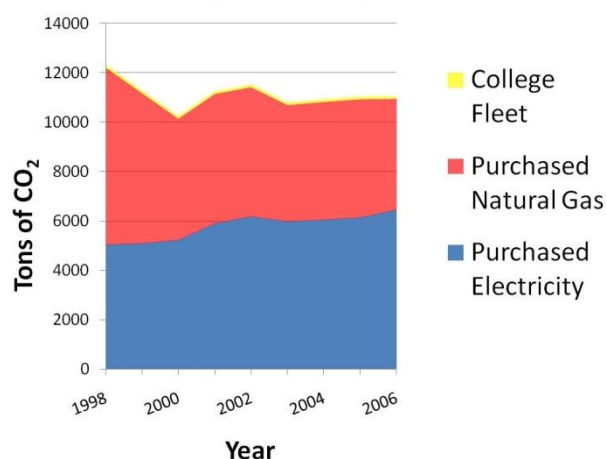
We examined our overall energy use on campus from 1998-2006. Our use of natural gas has declined with our boiler renovations while electricity use has increased by an average of 3 percent per year. Projections of future CO₂ emissions suggest that we may produce between 11,000 (0 percent increase) and 35,000 (2.5 percent annual increase) tons of CO₂ per year without mitigation measures.

Critical to successful reduction of CO₂ emissions is our commitment to implement mitigation and education principles targeted at increasing our efficiency and decreasing our dependence on electricity and natural gas in our buildings.

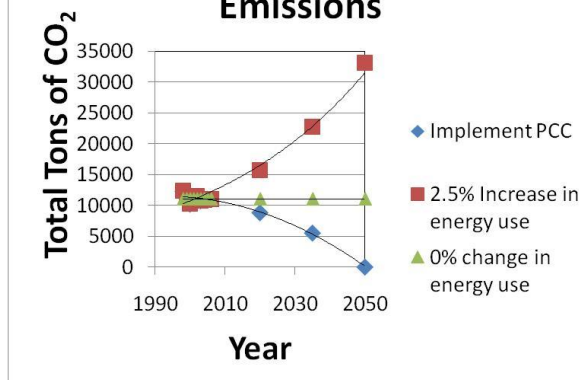
2006 % Emission by Source



Total CO₂ Emissions by Source



Projections of CO₂ Emissions



Mitigation principles

Western State College of Colorado is committed to reducing the use of energy and resources associated with greenhouse gas emissions through conservation and efficiency activities and exploring alternative sources for our energy needs. We recognize that a major source of energy use at our institution involves our buildings. As such, we are committed to applying environmental stewardship principles to emphasize energy conservation and efficiency in building renovations and new facilities.

- Reducing carbon emissions associated with electricity and natural gas use will have fiscal benefits given rising energy costs. At Western, we project that our energy budget will increase by greater than \$1,000,000 (see *Financing* section on page 4) within the next 15 years without increased efficiency and energy conservation measures. During the next 5 years, the College will incorporate into the engineering of all renovation and new construction projects measures that will lower our emissions and generate a projected savings in budgeted utility costs. To the extent possible, new initiatives supporting the reduction of energy use shall be funded through multi-year savings from programs that promote reduced energy use and increased energy efficiency in current practices.
- Simultaneously, it is important to also realize the educational value in symbolic acts—those that may not realize direct financial benefits—in fostering cultural change.
- Successful reduction of carbon emissions requires active and regular monitoring of energy use related to emissions. In order to achieve this goal, we will improve equipment and monitoring capacities and create an organizational structure (see *Implementation and Tracking* section on page 6) that encourages active and regular monitoring of energy use and carbon uptake on the Western campus. Individuals within the organization will synthesize, analyze, and update energy use and carbon emission data and provide recommendations to the cabinet for Western’s next steps towards carbon neutrality.
- Where possible, we will work to ensure that campus units or groups using energy can be assessed for their usage and rewarded for their energy and financial savings.
- We will explore, advocate, and purchase regionally appropriate and fiscally feasible alternative energy sources as they become available.
- Achieving carbon neutrality by 2050 may require expenditure of funds to purchase carbon offsets. However, we believe that direct carbon reduction activities, which are fiscally more responsible than offsets and are important for nurturing a campus and community culture of energy conservation and efficiency, should be our first focus. If we do engage in future offset projects, we encourage developing relationships that allow our students opportunities to engage in education, research, and monitoring in ecosystems in which our carbon offsets are implemented.

An example scenario demonstrating these principles can be found in the Appendix. Envisioned is that these types of “low hanging fruit” will be investigated and implemented during the first 5 years of Western’s plan. In addition to beginning these first steps, implementation of the educational and community outreach principles below is critical to the success of the mitigation measures necessary to achieve carbon neutrality by 2050.

Educational and community outreach principles

Western State College of Colorado is committed to cultivating a living and learning culture by demonstrating and providing choices for practicing a sustainable lifestyle. The educational vision will be accomplished through student empowerment, learning opportunities, community outreach, infrastructure, and campus communications.

- **Student Empowerment:** Western will encourage and facilitate the civic engagement of students through service, educational, and outreach efforts that promote sustainable practices within the College community.
- **Learning Opportunities:** Western will provide students, staff, and faculty with learning options to deliver sustainability education and promote ecological awareness.
- **Community Outreach:** Western will provide a campus model of sustainability and convene public environmental events that inspire and assist others in achieving carbon neutrality.
- **Infrastructure:** Western will utilize the architecture and physical infrastructure of the campus (academic and residence buildings and our inter-building spaces) to assist with the facilitation of sustainability education and cultural change.
- **Communication:** The College's pledge to the President's Climate Commitment will be explicit in official internal and external College communications. Progress toward our goals will be publicly available.

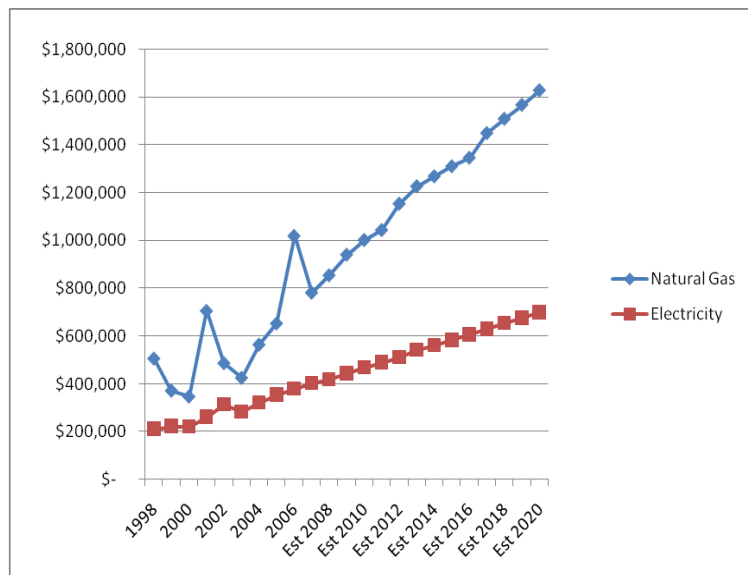
These educational and community outreach principles are key to the change in culture needed for Western to fulfill its commitment to carbon neutrality.

Financing

College facilities managers acknowledge that investments in improving energy efficiency of aging building systems are often cost effective and offer attractive rates of return. However, they may be unable or at least reluctant to implement energy saving measures because of a lack of adequate funds to support the needed capital improvements. Even if capital investments can be recovered quickly from projected savings in energy costs, it is often difficult to borrow against such future operating cost savings to finance such investments.

Additional financial roadblocks to energy efficiency investments may result from the separation between building occupants and those paying the energy cost. Most occupants of educational facilities are not aware of energy use and do not pay energy bills.

Despite the challenges and roadblocks mentioned above, it is imperative that we seek fiscal solutions to reducing greenhouse gas emissions and energy costs. Unless mitigation efforts are undertaken, the College can expect a minimum of 97 percent increase in utility costs by 2020 over 2007 costs resulting in a projected



increase of over \$1,000,000 additional dollars per year being spent on utilities. This projection was calculated using a rolling average to project estimated energy costs through year 2020. The average increase in unit costs from years 1998 through 2007 was added to year 2007 energy costs to estimate year 2008 costs. Each subsequent year was calculated in the same way resulting in the graphical estimate in the figure to the right.

Western will explore establishing a capital fund for energy-saving and emission reduction projects and/or a revolving fund for such projects to help finance the capital costs of efficiency improvements.

An imperative step in the institution's progress toward carbon neutrality is to monitor energy usage for each building. While our ability to monitor natural gas at a building level is possible, we cannot currently measure residence halls or building use of electricity. The mitigation principles include the importance of individual units or groups using energy to be assessed for their usage or rewarded for their savings. Smith, Seckman and Reid, an electrical engineering firm, estimated in 2008 the cost of installing individual electric meters in each campus building to be \$86,000. The current and planned renovation projects on campus provide an opportunity to include these meters as part of the project and thus further reduce the cost of equipping the remaining buildings.

In addition to the above, being able to monitor energy usage within buildings is a necessary first step to entering into a performance contract. Energy service companies (ESCOs) implement energy efficiency improvements on a performance-contracting basis, facilitate financing and guarantee financial savings against a projected utility cost model. Performance contracting is an alternative financing strategy that allows educational facilities to finance energy-efficiency projects. Performance contracting uses projected energy savings from installed efficiency measures to pay for the project, including energy-saving equipment, installation, and maintenance services. The distinguishing characteristics of an energy performance contract include:

- Only one contractor is made accountable for design, purchase, installation, maintenance, operation of the equipment and any necessary training.
- The contractor may provide services that facilitate College financing to implement energy conservation measures.
- Payments by the College to the energy service contractor are made after project completion and the amount is contingent upon savings achieved against a projected utility cost model.
- The contractor assumes the technical risk of energy savings performance.
- Energy-efficiency specialists can select state-of-the-art energy-efficiency technologies.

In 1996, Western entered into a performance contract to install individual boilers in each of its auxiliary buildings and provide energy-saving lighting retrofits in all buildings. The predicted average annual energy savings were \$296,825, maintenance savings averaged \$206,350 and the net annual savings after lease payments were factored in were projected to be \$22,268. The contract guaranteed annual energy savings of 772,576 CCF of natural gas and 2,102,002 KWH of electricity. Critical to our future success is exploring new energy performance contracts.

Smaller steps also need to be taken and some can be implemented quickly. A \$500,000 revolving fund could provide funding for various energy-saving measures which would "pay back" the fund through cost savings. Along with the energy efficiency fund, we will seek endowed gifts and grants for sustainability initiatives to help reduce overall general fund energy expenditures. Grants will be explored annually by the Office of Sponsored Programs.

Implementation structure for tracking progress and updating

Western's Sustainability Action Committee (SAC) serves to implement, assess, and modify the Environmental Charter, the President's Climate Commitment, and future campus sustainability initiatives. Membership of the committee includes the vice presidents for student affairs, finance and administration, and academic affairs or their respective designees; a representative appointed from the faculty senate; a representative appointed from the chairs and directors; a student appointed by SGA, a student appointed by the Western Sustainability Coalition, the director of facilities, and any sustainability coordinator(s) as might be appointed by the president. Annually, a member of the committee is appointed chair by the president. The SAC annually researches best practices from other higher education institutions and private sector organizations committed to carbon neutrality. The committee synthesizes, analyzes, and updates data and proposes new goals and recommendations to the cabinet and campus community as appropriate, but no less often than every five years. The committee is responsible for coordinating sustainability projects and collaborating with students, faculty, and staff.

Appendix

Case Study

Residence halls—from a drain on resources to a showcase for living and learning

The following case study provides an illustration of how the guiding principles can be used to achieve carbon emission reduction goals. In this example, we focus on a 20 percent reduction by 2020 in one residence hall complex. The guiding principles are shown in bold italics.

As outlined below, student-driven research and other learning opportunities can provide the necessary baseline information and ongoing monitoring to inform and direct cost-effective actions to reach carbon reduction goals. These actions are based on the commitment to energy efficiency and conservation that will provide energy savings to fund larger projects in the years to come. If the institution also has the ability to accurately monitor electrical and gas use, we can provide incentive-based opportunities for group units (e.g., residence halls) to lower energy usage. Such strategies have proven highly effective at other campuses, resulting in significant CO₂ reductions and associated cost savings.

Western State College of Colorado is committed to cultivating a living and learning culture by demonstrating and providing choices for practicing a sustainable lifestyle. The educational vision will be accomplished through student empowerment, learning opportunities, community outreach, infrastructure, and campus communications.

Student Empowerment: Western will encourage and facilitate the civic engagement of students through service, educational, and outreach efforts that promote sustainable practices within the College community.

Learning Opportunities: Western will provide students, staff, and faculty with learning options to deliver sustainability education and promote ecological awareness.

Student empowerment and integrating course work with the climate commitment have already provided important baseline information. Based on the campus inventory of carbon emissions, greater than 95 percent of the College's emissions come from building heating (41 percent) and electricity (58 percent). Student research (e.g., freshman Environmental Biology courses, upper-level ENVS courses, and independent projects) has further shown that residence halls are contributing over 80 percent of total campus emissions related to heating, with per-square-foot, -heating-related emissions more than two times that of other buildings (Figure 1). For example, student monitoring of campus natural gas use in the fall of 2007 calculated 813 tons of monthly carbon emitted from campus buildings with over 650 tons coming just from residence halls. Complexes like Mears (184 tons/month) and Shavano (169 tons/month), combined, were contributing greater than 20 percent of the total campus carbon emissions related to natural gas use.

At Western, we are committed to applying environmental stewardship principles to emphasize energy conservation and efficiency in building renovations and new facilities.

Successful reduction of carbon emissions requires active and regular monitoring of energy use related to emissions.

The guiding principle of emphasizing energy efficiency and conservation is an important starting point for most reduction strategies. For Mears complex, which annually emits 1,546 tons of carbon from natural gas heating and lighting, achieving a 20 percent reduction by 2020 would mean reducing annual carbon emissions by 309 tons. This goal can be achieved by simple energy efficiency and conservation actions which are intertwined with student research and monitoring, as well as changes in student behavior through incentive and education programs. Follow-up student research in Mears complex suggests that windows may account for 25 percent of heating losses, and common areas may account for

60 percent of electricity used for lighting. A 75 percent reduction in electricity usage (through both conservation and efficiency actions) can be achieved over a six to eight-year period by reducing the number of lights in use by a quarter, the wattage of lights in use by a quarter (e.g., from 32 watt to 24 watt), and by reducing the amount of time lights are on (through motion detectors and changes in student and staff behavior). These actions would equate to a reduction in carbon emissions of 52 tons in six to eight years and a total savings of \$25,000 (based on a 4 percent annual increase in electric prices). Simultaneous with the electrical reduction, a conservation action—such as resetting and reprogramming the thermostats in the complex to a three-degree difference—could reduce annual natural gas emissions by as much as 15 percent or 222 tons.

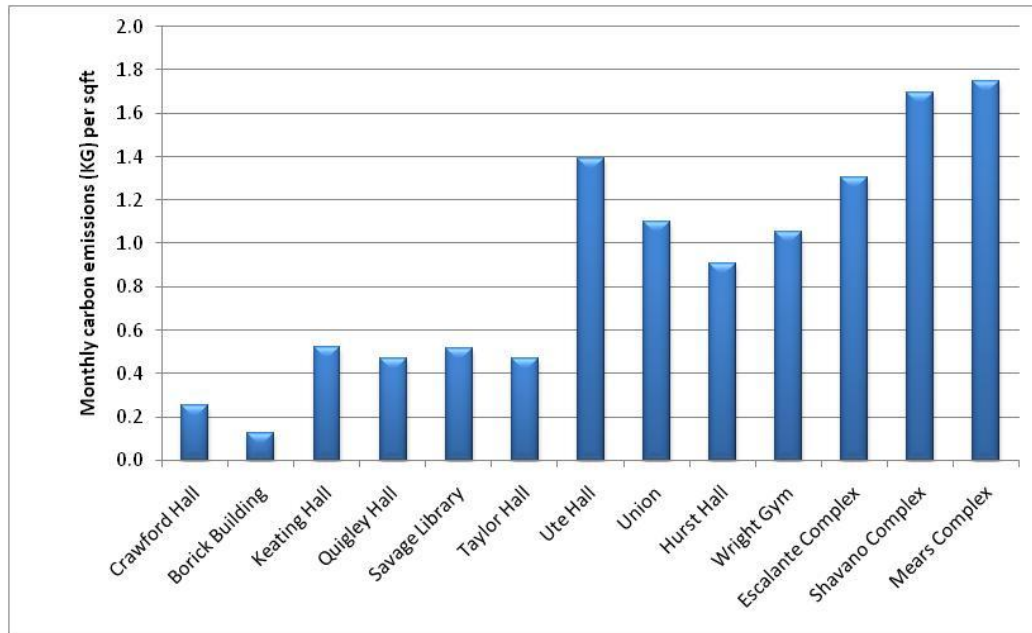


Figure 1. Average monthly carbon emissions related to heating per square foot for campus buildings in fall 2007. Kelley Hall was under renovation during this period, and the building data are excluded from this comparison (ENVS 301 project – Kissel, et al.).

Reducing carbon emissions associated with electricity and natural gas use will have fiscal benefits given rising energy costs.

Assuming continued increases in energy costs, reducing carbon emissions associated with electricity and natural gas use will have even greater fiscal benefits. In this example, the energy savings resulting from electrical and natural gas reductions could fund replacement of single-paned, inefficient windows with energy-efficient, double-paned windows. Window upgrades of this sort can reduce natural gas use by 25 percent or 314 tons. In Mears complex, this action could reduce its total emissions by 588 tons or 38 percent by 2020, well above the 20 percent goal.

We will explore, advocate, and purchase regionally appropriate and fiscally feasible alternative energy sources as they become available.

Campus-wide energy savings can help fund replacement of fossil fuels with alternative energy sources. If the guiding principles of emphasizing energy efficiency and conservation—in tandem with incentive-based reductions—were applied to all residence halls, total annual carbon reductions from residence halls could be as much as 2,940 tons or 26 percent of the campus total. These changes could result in energy savings of about \$350,000 annually (calculated without annual energy-price increases). Such savings could be used to fund larger renovations, incorporating passive solar and alternative energy technologies like solar and wind. By 2035, additional improvements and renovations could result in our

achieving 50 percent reductions in emissions. Such additional reductions could result from LEED Gold or similar renovations, resulting in an additional 40 percent reduction in energy use.

Achieving carbon neutrality by 2050 will likely require expenditure of funds to purchase carbon offsets.

We believe that direct carbon-reduction activities—which are fiscally more responsible than carbon offsets and are important for nurturing a campus and community culture of energy conservation and efficiency—are our first priority. However, our final goal of carbon neutrality by 2050 will likely occur with either offsets or significant changes in the availability of renewable resources. If we do engage in future offset projects, we encourage the development of relationships that allow our students opportunities to engage in education, research, and monitoring of ecosystems in which our carbon offsets are implemented.

Conclusion

Through simple, cost-effective strategies, we can significantly reduce residence hall carbon emissions. In addition, residence halls like Mears and Shavano could transition from a drain in energy resources to living and learning laboratories that showcase Western's commitments to environmental stewardship, active student involvement and learning in daily lives, and providing leadership for the community at large.