



UNIVERSITY  
· OF ·  
COLORADO  
AT COLORADO SPRINGS

# Climate Action Plan



30 June 2010

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## LIST OF ACRONYMS

ACUPCC	American College and University Presidents Climate Commitment
ASHRAE	The American Society of Heating, Refrigerating and Air Conditioning Engineers
BTU	British Thermal Unit
CH <sub>4</sub>	Methane
CO <sub>2</sub> e	Carbon Dioxide Equivalent
COPIRG	Colorado Public Interest Research Group
CU	University of Colorado
CSU	Colorado Springs Utilities
ESS	Environmental and Sustainability Studies
FTE	Full Time Equivalent
FY	Fiscal Year
GHG	Green House Gas
GSG	Greening of State Government
HFC	Hydro fluorocarbon
HVAC	Heating, Ventilating, Air-conditioning
kW	Kilowatt
kWh	Kilowatt Hour
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LEED	Leadership in Energy & Environmental Design
mtCO <sub>2</sub> e	Metric Ton Carbon Dioxide Equivalent
MUCC	Mandatory Utility Containment Committee
mW	Megawatt
MWHrs	Megawatt Hours
N <sub>2</sub> O	Nitrous Oxide
NCSE	National Council for Science and the Environment
PFC	Per fluorocarbon
RECS	Renewable Energy Credits
RTD	Regional Transportation District
SD	Sustainable Development Minor
SEAS	Students for Environmental Awareness and Sustainability
SF <sub>6</sub>	Sulfur hexafluoride
SGA	Student Government Association

# 1 INTRODUCTION

As an original signatory to the American College and University Presidents Climate Commitment (ACUPCC) in 2007, the University of Colorado at Colorado Springs (UCCS) formed the Climate Action Committee to analyze and project a date by which the campus could attain carbon neutrality. The group, consisting of directors overseeing significant operations for the campus as well as faculty members and students, were tasked with identifying, analyzing, and prioritizing GHG reduction projects as well as developing strategies to meet the Colorado 2007 Greening of State Government Executive Orders. Additionally, the group was charged with creating a comprehensive climate plan and ensuring completion of a biannual greenhouse gas emission (GHG) inventory.

## A. AUTHORS AND CONTRIBUTORS

### UCCS Climate Committee

- Brian Burnett, Vice Chancellor for Administration and Finance
- Dr. Peg Bacon, Provost
- Gary Reynolds, Executive Director Facilities Services
- Linda Kogan, Sustainability Director
- Jeff Davis, Director, University Center
- Rob Dougherty, Physical Plant Director
- Jim Spice, Director of Public Safety
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- Dr. Julie Albertson, MAE Faculty
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- Dr. Peg Bacon, Provost
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- Linda Kogan, Sustainability Director
- Kevin Gilford, Graduate Student, Sustainability Office Manager

## **B. AMERICAN COLLEGE & UNIVERSITY PRESIDENTS CLIMATE COMMITMENT**

"We, the undersigned presidents and chancellors of colleges and universities, are deeply concerned about the unprecedented scale and speed of global warming and its potential for large scale, adverse health, social, economic and ecological effects. We recognize the scientific consensus that global warming is real and is largely being caused by humans...

We believe colleges and universities must exercise leadership in their communities and throughout society by modeling ways to minimize global warming emissions, and by providing the knowledge and the educated graduates to achieve climate neutrality. Campuses that address the climate challenge by reducing global warming emissions and by integrating sustainability into their curriculum will better serve their students and meet their social mandate to help create a thriving, ethical and civil society.

We further believe that colleges and universities that exert leadership in addressing climate change will stabilize and reduce their long-term energy costs, attract excellent students and faculty, attract new sources of funding, and increase the support of alumni and local communities.

### **Accordingly, we commit our institutions to taking the following steps in pursuit of climate neutrality:**

1. Initiate the development of a comprehensive plan to achieve climate neutrality as soon as possible.
  - a. Within two months of signing this document, create institutional structures to guide the development and implementation of the plan.
  - b. Within one year of signing this document, complete a comprehensive inventory of all greenhouse gas emissions (including emissions from electricity, heating, commuting, and air travel) and update the inventory every other year thereafter.
  - c. Within two years of signing this document, develop an institutional action plan for becoming climate neutral, which will include:
    - i. A target date for achieving climate neutrality as soon as possible.
    - ii. Interim targets for goals and actions that will lead to climate neutrality.
    - iii. Actions to make climate neutrality and sustainability a part of the curriculum and other educational experience for all students.
    - iv. Actions to expand research or other efforts necessary to achieve climate neutrality.
    - v. Mechanisms for tracking progress on goals and actions..."

## 2 CARBON GOALS AND EXECUTIVE SUMMARY

The Climate Action Committee has developed this initial Climate Action Plan to fulfill requirements set forth as signatories to the ACUPCC and includes goals established by the State of Colorado Governor's Greening of State Government Executive Orders D011 07 and D012 07. It is in accordance with the University Of Colorado Board Of Regents' Sustainability Resolution passed in October 2009 (Appendix A) and is intended to be a planning document to assist the Climate Action Committee and the UCCS Leadership Team in developing policy and establishing priorities. This is a dynamic plan that will be altered as the campus grows, funding is made available, and new technologies arrive. Regularly scheduled updates to this plan will be provided to the Chancellor of UCCS and the plan will be updated formally every five years. The plan includes recommendations in many areas to guide further carbon reductions on the campus.

### **Alignment and Synergies**

In recent years UCCS has made significant strides in sustainability. The 2007 Facilities Strategic Plan Update, 2007 UCCS Strategic Plan, and 2007 UCCS Sustainability Strategic Plan all provide guidance and alignment with the adoption of the ACUPCC. Sustainability is prioritized with specific goals including a significant focus on energy efficiency, renewable energy, and high performance building. Students, faculty, and staff have demonstrated a commitment to sustainability through fees passed to fund renewable energy, the development of a sustainable development minor, 4 LEED Gold buildings, the hosting of a sustainability summit, and many other endeavors. This climate plan provides the opportunity to capitalize on and further earlier strategic planning efforts. This plan is supported by the leadership of UCCS as demonstrated in Chancellor Dr. Shockley-Zalabak's statement:

We are in an era requiring leadership and innovative approaches to prepare our graduates for a rapidly changing global environment. UCCS seeks to play a pivotal leadership role in creating a culture of sustainability, providing both the knowledge and practices that students can carry with them into their lives after college. We are committed to a sustainability vision that builds on our early successes and utilizes all of our talents to create a legacy for future generations.

I signed the American College and University Presidents Climate Commitment on behalf of faculty, staff, and students. To significantly reduce our carbon emissions and incorporate sustainability into the curriculum will take a concerted effort by the entire campus community.

I invite all of the UCCS community to get involved in helping the campus to reduce its carbon footprint, model sustainable practices for our students, and provide curriculum that facilitates the leadership needed to address this era's significant challenges.

-Pam Shockley Zalabak, Chancellor, University of Colorado at Colorado Springs



## **Carbon Risk**

In this era organizations must start to approach strategic management of GHG emissions as they would all other assets or liabilities on their balance sheet. Risks for UCCS primarily feature potential increased energy costs from mandatory caps on GHG emissions and carbon taxes, direct impacts of climate change in the region (e.g., droughts and hotter climate drive up water costs), as well as recruitment and retention risks based on the importance of climate issues and perceived performance to prospective students and campus community members.

## **GHG Emissions Inventory, Scopes 1 & 2**

Scope 1 and 2 emissions, which include natural gas, fleet fuel, and purchased electricity, totaled 17,604 metric tons of carbon dioxide equivalent (mtCO<sub>2</sub>e) for the baseline year of 2006. Due to energy efficiency projects and new LEED buildings, the university's GHG Scope 1 and 2 emissions have grown on average only 1.6 percent per year since 2006 despite a 2.9 percent average per year Full Time Equivalent (FTE) student growth rate and 6% building gross square footage increase. With no further mitigation, GHG emissions are projected to increase 3.3% per year through 2020. In FY 2009, the university's GHG emissions were 18,073 mtCO<sub>2</sub>e or 2.52 mtCO<sub>2</sub>e per FTE student.

## **Climate Strategies**

The Climate Action Committee has selected to focus significant efforts on the next 10 years, while continuing to develop the most cost and carbon effective strategies for the longer term. Consistent with other CU System campuses and with the State of Colorado's Climate Action Plan, the Task Force recommends the following goals for absolute GHG emissions reductions:

- By 2020 - 20% decrease from baseline = 14,083 mtCO<sub>2</sub>e
- By 2030 - 50% decrease from baseline = 8,802 mtCO<sub>2</sub>e
- By 2050 - 80% reduction from baseline = 3,521 mtCO<sub>2</sub>e

Actions and projects are phased over four time periods. By aggressively pursuing these targets, UCCS will lay the foundation for more comprehensive strategies for emissions reductions as well as increasing the culture of sustainability and climate action within the campus community. These four time windows and their GHG reduction benchmarks (FY2006 baseline), are listed below for UCCS. An overview of the strategies (Table 1) is provided on page 7.

## **GHG Emissions Targets & Phasing**

- **Phase 1 (2010 - 2012):** Fulfillment of the Governor's Executive Order on the Greening of State Government –
  - 20% reduction in Energy Use Intensity,
  - 20% reduction in paper use,
  - 10% reduction in water consumption,
  - 25% reduction in petroleum use and a “zero-waste” goal for all construction and facility operations.
- **Phase 2 (2012 - 2020):** Energy Efficiency, Conservation and Small-Scale Renewables - 20% reduction in GHG emissions
- **Phase 3 (2020 - 2030):** Large-Scale Renewables - 50% decrease in GHG emissions
- **Phase 4 (2030 - 2050):** New and Emerging Technologies - 80% reduction in GHG Emissions

**Feasibility Assessments**

Making investments to reduce GHG production requires that the university carefully weigh the social and potentially mandated requirements for reducing GHG production and our fiduciary responsibility as stewards of public funds. To ensure that the university balances these requirements, internal criteria will be established to guide investments focused on reducing GHG emissions, and they may be modified to meet the needs of the institution and/or changes in the operating and financial environment.

**Funding Mechanisms**

Various funding opportunities exist for GHG reduction projects from within and outside of the university. Internal funding could come from general fund allocations, user fees, and the issuance of additional long term debt. The establishment of a “revolving loan fund” is crucial to the success of climate action initiatives to potentially use savings from projects to reinvest in new projects. External funding could come from local, state and federal grant funding programs, private contributions and venture capital groups. The financial challenges facing the university at present are substantial and may impede the institution’s ability to make large investments in these areas in the near term. However, the university is committed to meeting its emissions reduction targets and will continue to examine ways to prioritize funding toward this investing in the future.

**Academic and Research Programs**

UCCS recognizes the key role that sustainability and climate education plays in not only meeting climate goals but, perhaps more importantly, training the next generation of leaders to make sound decisions that contribute to a more sustainable world. Climate and sustainability literacy is an increasingly important focus at the university.

A team of faculty, staff and students was assembled 24 months ago to address the challenge of incorporating sustainability and climate change into the curriculum as well as provide extracurricular opportunities for students to learn. UCCS has a multidisciplinary minor in Sustainable Development and sustainability is a significant focus in the undergraduate Geography and Environmental Studies program. The College of Letters, Arts and Sciences has selected sustainability as the main theme for the 2011 academic year and is currently planning lectures and curriculum to increase sustainability literacy. In the 2012 academic year, the university is planning an “All Campus Reads” using a book on sustainability or climate change. In 2010, a presentation on sustainability was added to new and transfer student orientations. There is a committee on campus that is considering the addition of sustainability to the campus’ general education requirements as they are being reviewed.

**Conclusion**

UCCS is committed to reducing emissions and progressing toward carbon neutrality, while continuing to address current and projected budget challenges and fulfill the university’s mission. The Climate Action Committee recommends a strategy of focusing on the short term goal of identifying and implementing specific projects to reach a 20 percent reduction by 2020, while continuing to evaluate and consider larger projects for more significant reductions in the long term. The Climate Action Committee recognizes that a 20% reduction in emissions by 2020 will require significant coordination, and planning, a dedication to identifying and pursuing more energy efficiency projects, and a commitment to funding both internally and with partners in the community.

**Table 1 Summary of UCCS Climate Action Plan**

<b>% Reduction</b>	<b>Goal Year</b>	<b>Mitigation Strategies &amp; Tactics (Adopted by end of Goal Year)</b>	<b>Notes</b>	
0-5%	FY2012	<b>Phase 1 Meet Greening of State Government Goals</b> <ul style="list-style-type: none"> <li>• <b>Energy Efficiency projects</b> <ul style="list-style-type: none"> <li>○ Fully expend \$1.3 million Energy performance bond on projects</li> </ul> </li> <li>• <b>Behavioral Conservation Campaigns</b> <ul style="list-style-type: none"> <li>○ Mandatory Utility Containment Committee and Building proctor program started</li> <li>○ Green Team of Sustainability Committee – focus on behavioral change campaigns</li> </ul> </li> <li>• <b>Renewable Energy</b> <ul style="list-style-type: none"> <li>○ Renewable Energy Credits purchased for one building</li> <li>○ Solar Thermal installed for swimming pool</li> <li>○ Photovoltaic installed Science &amp; Engineering</li> </ul> </li> </ul>	<p>Only requires 20% energy use intensity reduction which, with UCCS growth, will not translate into significant overall emissions reductions</p> <p><b>Specific Goals:</b></p> <ul style="list-style-type: none"> <li>• 20% Reduction in energy use intensity</li> <li>• 10% Reduction in water use</li> <li>• 25% Reduction petroleum use</li> <li>• 20% Reduction paper use</li> <li>• Zero waste goals in operations and construction</li> </ul>	<b>Short Term</b>
20%	FY2020	<b>Phase 2 Energy Efficiency, Conservation &amp; Small- medium scale renewables,</b> <ul style="list-style-type: none"> <li>• <b>Greening of the Grid</b></li> <li>• <b>High Efficiency new buildings</b> <ul style="list-style-type: none"> <li>○ LEED Gold Policy From SB51-07, Goal of 40% improved energy efficiency over ASHRAE 90.1</li> </ul> </li> <li>• <b>Behavioral Conservation Campaigns</b></li> <li>• <b>Energy Efficiency projects</b></li> <li>• <b>Renewable Energy</b> <ul style="list-style-type: none"> <li>○ Potential large scale wind or solar project</li> </ul> </li> </ul>	<p>Energy efficiency, high performance building, behavioral campaigns, and the greening of the grid will account for approximately 50% of target emissions reductions. The balance will need to come from renewable energy sources.</p> <p>A Renewable Energy Standard of 30% by 2020 was passed by the state but is not binding on Colorado Springs Utilities</p>	<b>Mid Term</b>
50%	FY2030	<b>Phase 3 Addition of Large Scale Renewables</b> <ul style="list-style-type: none"> <li>• <b>Continued greening of the grid</b></li> <li>• <b>Large solar or wind projects</b></li> <li>• <b>Continued efficiency projects</b></li> <li>• <b>Continued conservation campaigns</b></li> <li>• <b>Consideration of geothermal projects</b></li> </ul>	<p>This period defined by development of large-scale renewable resources such as wind energy and solar power plants. These projects may require collaborations with other universities, the City of Colorado Springs, and CSU.</p>	<b>Long Term</b>
80%	FY2050	<b>Phase 4 Inclusion/Adoption of Emerging Technologies</b> <p>Emerging technologies will become more financially viable as they enter new markets over the next 20-40 years.</p> <p>Other externalities such as carbon capture and storage sequestration technologies, and small amounts of new nuclear energy are possible.</p> <p>The grid continues to green with solar and wind. Programs from earlier phases continue.</p>	<p>There are very few alternatives for heating UCCS buildings without natural gas. Geothermal energy, carbon credits or development of offset projects may be necessary to reach the 80% goal.</p>	

## Summary of UCCS 2010 Climate Recommendations

<b>ENERGY EFFICIENCY</b> <ul style="list-style-type: none"> <li>➤ Designate energy or project manager to direct energy projects.</li> <li>➤ Assign staff to capitalize savings opportunities with Building Automation System</li> <li>➤ Determine funding source to pursue energy projects needed to reduce emissions</li> <li>➤ Develop energy benchmarks for each building and monitor energy reduction</li> </ul>	<b>PAPER USE</b> <ul style="list-style-type: none"> <li>➤ Encourage faculty members to require students to turn in double-sided papers</li> <li>➤ Encourage use of 1 inch margins across campus instead of current 1.25 default</li> <li>➤ Encourage publications and internal processes go paperless</li> </ul>	<b>WATER EFFICIENCY</b> <ul style="list-style-type: none"> <li>➤ Retrofit campus with .5 gpm aerators to match standard in campus LEED buildings</li> <li>➤ Invest in smart irrigation system to significantly reduce water use</li> <li>➤ Consider treatment for cooling towers to reduce water use</li> <li>➤ Conduct water conservation campaigns in housing</li> </ul>	<b>FUEL USE</b> <ul style="list-style-type: none"> <li>➤ Resize vehicle fleets to match task and size of vehicle</li> <li>➤ Ensure efficiency in trips for equipment and supplies purchases</li> <li>➤ Pursue more electric and alternative fuel vehicles incorporating non-mechanized transportation when possible</li> </ul>
<b>ENERGY EFFICIENCY- BEHAVIORAL</b> <ul style="list-style-type: none"> <li>➤ Strengthen MUCC committee to expand campus reach, select yearly targets and projects, and provide quarterly feedback to administration</li> <li>➤ Work with staff and faculty to reduce space heater use and replace with lower wattage equipment where necessary</li> <li>➤ Address energy use in housing</li> <li>➤ Pursue Eco-reps program</li> <li>➤ Supply information about Energy STAR appliances, power strips, etc., and a campus culture of sustainability and energy conservation in housing newsletters and communication</li> </ul>	<b>HIGH EFFICIENCY NEW BUILDINGS</b> <ul style="list-style-type: none"> <li>➤ Build to LEED Gold standards with a commitment to target 40% greater energy efficiency than ASHRAE 90.1. Target lighting intensity of 1W per square foot.</li> <li>➤ Monitor existing LEED buildings on campus to ensure than designed energy performance is being met. Address inefficiencies where discovered.</li> <li>➤ In renovations, ensure that energy efficiency retrofits are included to reach highest efficiency possible</li> </ul>	<b>TRANSPORTATION</b> <ul style="list-style-type: none"> <li>➤ Support development of RTD to reinstate bus service to the campus; secure discount tickets to campus community members</li> <li>➤ Provide rental car option for students to reduce cars on campus</li> <li>➤ Provide a guaranteed ride home service for carpools</li> <li>➤ Provide more preferred parking for hybrids or low emission vehicles</li> <li>➤ Separate parking lots from bicycle and pedestrian thoroughfares on campus</li> <li>➤ Support proposed trolley route to campus</li> </ul>	<b>WASTE MINIMIZATION</b> <ul style="list-style-type: none"> <li>➤ Increase waste minimization training in housing</li> <li>➤ Increase "zero waste" education efforts and incentives to boost rates of waste diversion</li> <li>➤ Work with vendors to reduce packaging</li> <li>➤ Adopt CU Green Purchasing Guidelines</li> <li>➤ Ensure that contractors for all projects are provided with targets for construction waste recycling. Monitor this process closely throughout construction</li> </ul>
<b>EDUCATION</b> <ul style="list-style-type: none"> <li>➤ Develop formal working group to target incorporation of sustainability and climate education in curriculum</li> <li>➤ Incorporate sustainability in general education requirements</li> <li>➤ Develop faculty curriculum training in sustainability using the "Knapsack Institute" model</li> <li>➤ Include sustainability at Freshman Seminar retreat to encourage faculty and staff to include sustainability in freshman seminars</li> <li>➤ Establish an "all campus reads" focused on sustainability -- this idea is being explored for the 2011-2012 academic year</li> <li>➤ Conduct sustainability and climate literacy assessment and repeat to track progress</li> <li>➤ Offer Sustainability Certificate program for professionals, potentially in partnership with community organizations or schools</li> </ul>	<b>FOOD</b> <ul style="list-style-type: none"> <li>➤ Encourage food service provider to purchase more local, organic and vegetarian food</li> <li>➤ Work toward trayless meals in order to reduce food waste.</li> <li>➤ Reduce bottled water on campus and provide more water bottle refill stations.</li> <li>➤ Partner with Sodexo to compost food services' waste that can be used on the campus organic vegetable garden as well as landscaping.</li> </ul>	<b>RENEWABLE ENERGY</b> <ul style="list-style-type: none"> <li>➤ Continue to develop capacity map for photovoltaic installations. Identify potential areas for geo-exchange technology</li> <li>➤ Work with Colorado Springs Utilities to facilitate financing options for third party purchase agreements for renewable energy</li> <li>➤ Establish renewable energy working group to target funding, explore opportunities, and work on contracts</li> <li>➤ Encourage and work with Colorado Springs Utilities and other organizations to pursue more renewable energy options to green the grid</li> <li>➤ Establish UCCS as a demonstration campus for renewable energy technologies</li> </ul>	
<b>CLIMATE PLAN IMPLEMENTATION</b>	<ul style="list-style-type: none"> <li>➤ Assign standing climate committee to direct and monitor progress on UCCS climate goals and report to leadership team</li> <li>➤ Complete full greenhouse gas inventory every 2 years with Scope 1 and 2 emissions measured every year</li> <li>➤ Present climate plan to campus community and interested community members</li> </ul>		

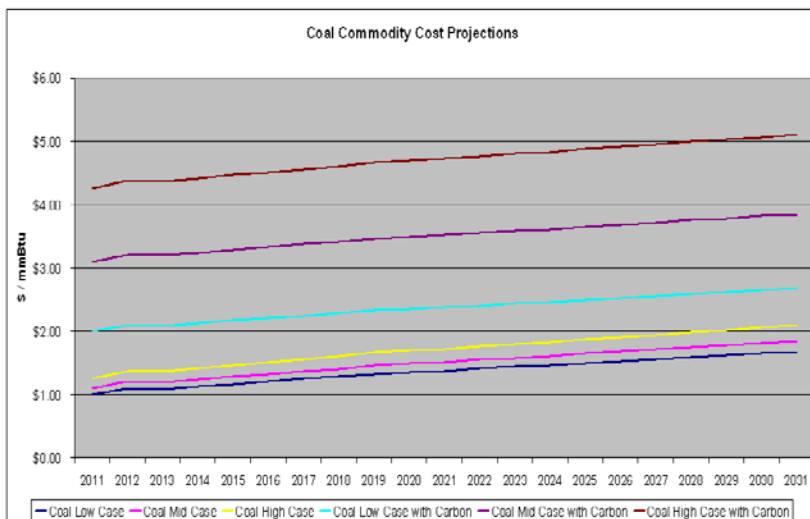


### 3 FUEL PRICES AND CARBON RISK

It is important to consider several types of risk associated with global climate change when planning for carbon neutrality -- all can have significant financial implications for organizations. Direct risks include the environmental impacts from climate change such as drought and a hotter climate, which can increase water and energy use. Indirect risks include the impacts of potential mandatory caps on carbon dioxide emissions levied on energy suppliers and the subsequent increase in costs of electricity and products. An additional indirect risk is market based and reflects consumer preferences regarding sustainability performance and reputational assets.

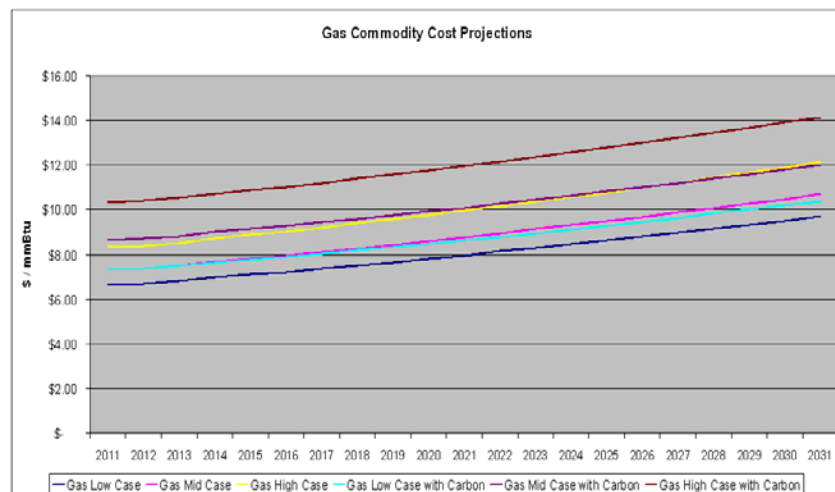
While there is uncertainty regarding the future costs of energy, there is recognition that energy prices will increase and will do so dramatically if carbon taxes are instituted. Below (Figure 1 and 2) are forecasts developed by Colorado Springs Utilities (SU) for the prices of coal and natural gas with and without low, medium, and high carbon taxes. As can be seen from both graphs prices are expected to rise consistently. With enactment of even the lowest level of the carbon tax scenarios, energy may double in cost for the university. Investing in energy efficiency and renewable energy in the near future is an excellent strategy to hedge some of this risk and keep operating costs lower.

**Figure 1. Colorado Springs Utilities Price Forecasts for Coal and Carbon**



Both graphs provided by Colorado Springs Utilities, Doug Anderson, October 2009

**Figure 2. Colorado Springs Utilities Price Forecasts for Natural Gas and Carbon**



## 4 UCCS GREENHOUSE GAS INVENTORY

### A. WHAT IS A GREENHOUSE GAS (GHG) INVENTORY?

Greenhouse gas emissions are gases in the atmosphere that absorb and emit radiation and affect the temperature of the Earth. There are six gases regulated by the Kyoto Protocol: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons and perfluorocarbons (HFC and PFC), and sulfur hexafluorides (SF<sub>6</sub>). UCCS used the Clean Air Cool Planet V6.4 tool for calculating its greenhouse gas emissions from 2006 to 2010. Emissions are reflected in the inventory by metric tons of carbon dioxide equivalent, (mtCO<sub>2</sub>e) which includes all of the above greenhouse gases.

### B. WHAT IS INCLUDED IN THE UCCS GHG INVENTORY?

Scope 1 GHG emissions are those directly occurring from sources that are owned or controlled by UCCS, including on-campus stationary combustion of fossil fuels (natural gas) and mobile combustion of fossil fuels (petroleum, diesel) by fleet vehicles. Scope 2 emissions are indirect emissions generated in the production of electricity by Colorado Springs Utilities and consumed by the university. Scope 3 emissions are indirect emissions that occur from sources not owned or controlled by the institution, but are a part of necessary activities for the university such as commuting, air travel for university activities, and waste disposal.

Greenhouse Gas emissions were included for all UCCS owned and controlled property. The inputs listed below were used; the input is followed by the source of the data.

#### Scope 1

- Natural Gas- Utility Bills, Heat for buildings
- Gasoline and Diesel fuel- sourced off-campus for university vehicles

#### Scope 2

- Electricity- Utility Bills

#### Scope 3

- Commuting Miles of Staff, Faculty, and Non Residential Students - calculated through a transportation survey
- Air Travel Miles- For faculty and staff purchased by university travel agent and procurement cards
- Solid Waste- Quantified by waste hauler

### C. WHAT IS NOT INCLUDED IN THE GHG INVENTORY AT THIS POINT?

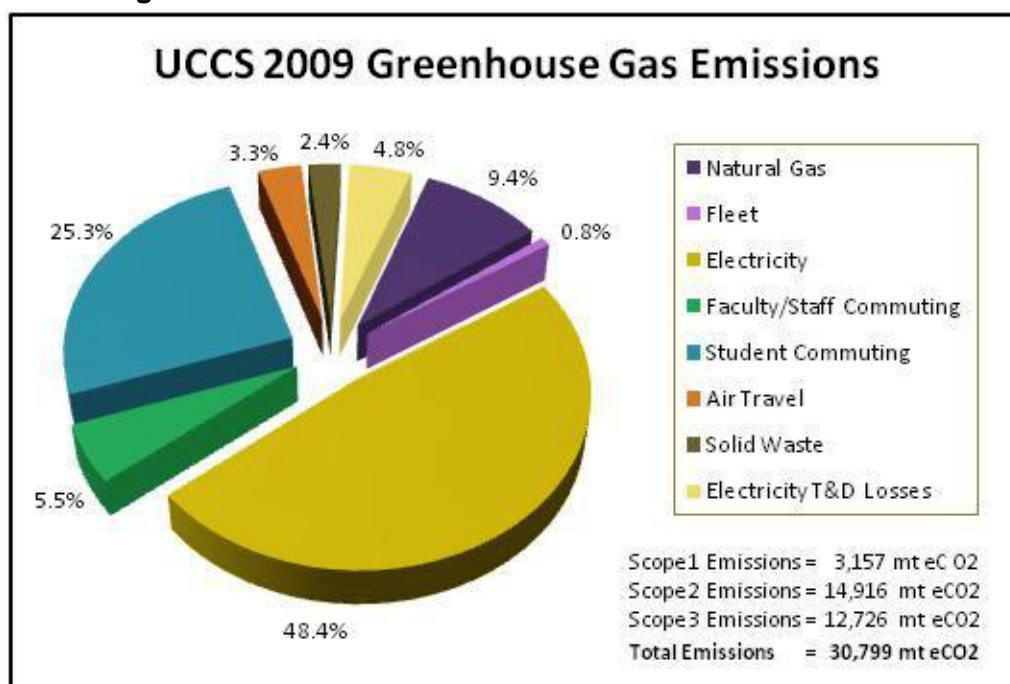
- Refrigerants-leaked from HVAC equipment and replaced yearly: This source was deemed to be less than 1% and may not need to be reported annually as per standard process.
- Food purchased by the university: There is currently not sufficient information to include this, although it is likely that given the average distance of food travel and methods of large scale farming, food is a measurable contributor of emissions.
- UCCS Athletics travel: There was not sufficient information to accurately assess emissions from this activity. The sustainability office will work with athletics to develop a tracking mechanism for future greenhouse gas inventories.

## D. 2009 RESULTS & TRENDS

2009 greenhouse gas emissions for UCCS totaled 30,799 mtCO<sub>2</sub>e. As shown in Figure 3, purchased electricity combined with transmission and distribution losses represents the largest portion of our carbon footprint (53.2%). This is based on a 2009 fuel mix from Colorado Springs Utilities of 69% coal, 19% natural gas, 9% hydroelectric, 2% spot purchases and less than 1% wind.

Electricity emissions are followed by commuting (30.8%), on-campus energy generation-natural gas (9.4%), air travel (3.3%), solid waste (2.4%), and university fleet (.8%). Transportation from commuting is a significant portion of our Scope 3 greenhouse gas emissions and is indicative of the very limited public transportation options and the physical location of the campus at the top of a significant hill. While UCCS is committed to reducing its entire footprint, for the purpose of this Climate Plan, the focus for quantifiable reductions is predominantly on Scope 1 and 2 emissions.

**Figure 3. UCCS 2009 Greenhouse Gas Emissions**



### GHG Emissions Inventory, Scopes 1 & 2

Scope 1 and 2 emissions includes natural gas use for heating, electricity for building lighting, computers, appliances, cooling, and other mechanical equipment, and finally petroleum for fleet vehicles. As evidenced by Figure 4, electricity is the most significant portion of UCCS emissions as its source is predominantly coal which produces roughly twice the carbon emissions as natural gas. Thus, the key to UCCS mitigation of emissions will depend significantly on reducing electricity consumption or converting it to a renewable energy source.

Figure 4. UCCS 2009 Scope 1 and 2 GHG Emissions

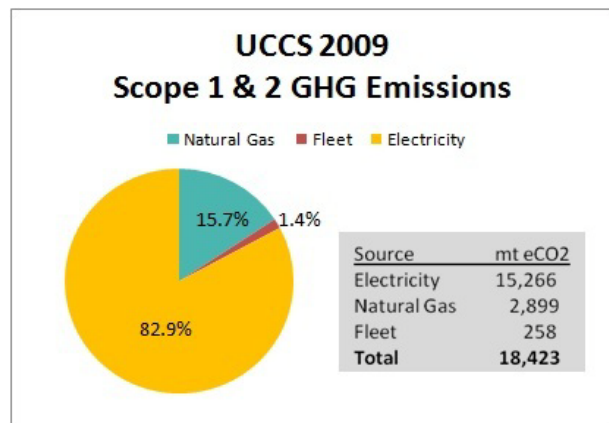
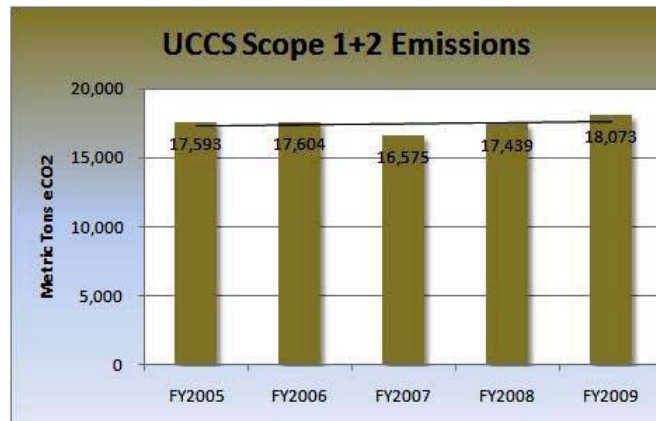


Figure 5. UCCS Scope 1 and 2 GHG Emissions Trend



### **GHG Emissions Trends 2006-2009**

Fiscal year 2006 was selected as the base year to be consistent with the 2007 Colorado Greening of State Government Executive Orders. Scopes 1 & 2 emissions (natural gas and gasoline/diesel combustion, purchased electricity) for the baseline year of 2006 totaled 17,604 mtCO<sub>2</sub>e. In FY 2009, the university's GHG emissions were 18,423 tons mtCO<sub>2</sub>e or 2.52 mtCO<sub>2</sub>e per FTE student. Due to significant energy efficiency efforts, the university's GHG Scope 1 and 2 emissions have grown on average only 1.5 percent per year since 2006 despite a 2.3 percent average per year FTE student growth rate and a building square footage growth rate of over 6 per cent (Figure 5).

## **E. PROJECTIONS**

### **Scope 1 and 2 Emissions Trajectory**

Campus building growth (sq. footage) is anticipated to average 1.85% per year with an average 3% growth in FTE student. With a business-as-usual approach, which assumes no additional GHG reduction initiatives are implemented, UCCS will generate 25,192 mtCO<sub>2</sub>e by 2020 (Figure 6). This is a 43% increase from the 2006 baseline and an average emissions growth rate of 3.1%. This projection was achieved using the Clean Air Cool Planet tool. If the trajectory is extended to 2050, emissions for UCCS would equal an estimated 43,661 mtCO<sub>2</sub>e, an increase of 148% from the baseline.



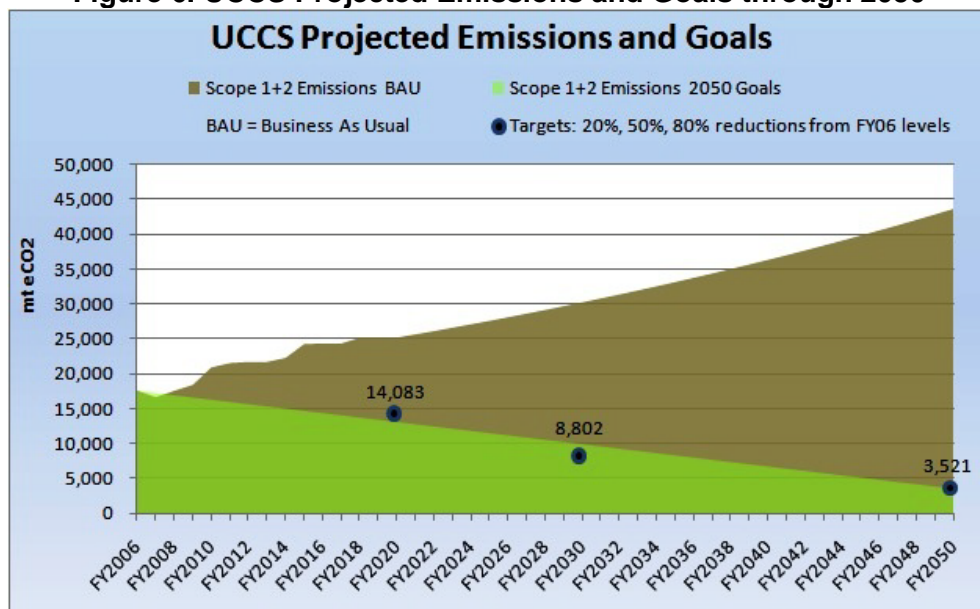
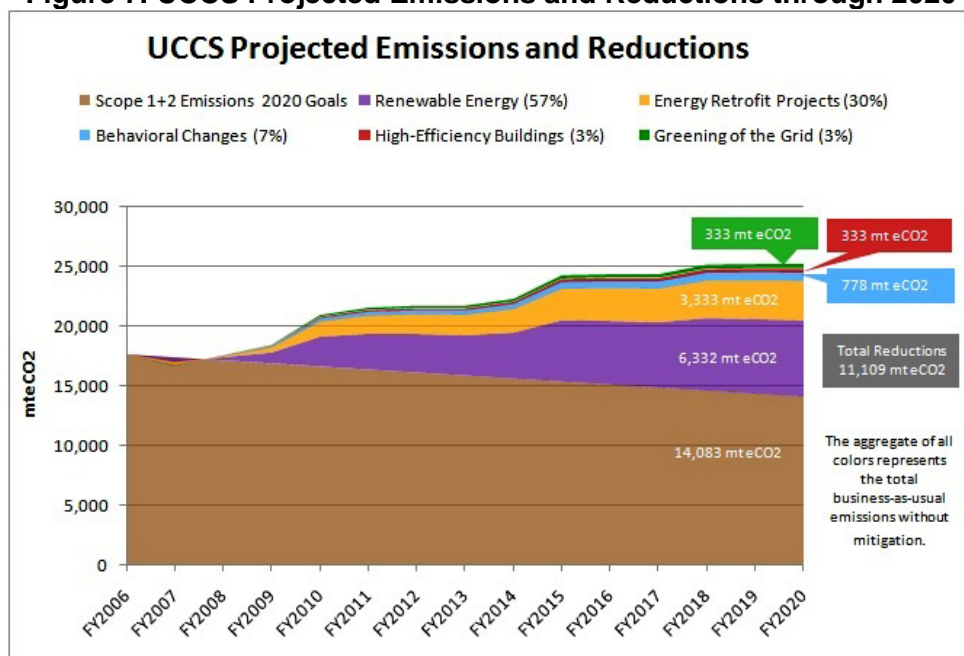
**Figure 6. UCCS Projected Emissions and Goals through 2050****Figure 7. UCCS Projected Emissions and Reductions through 2020**

Figure 7 highlights the trajectory as well as identifies the particular emissions strategies necessary to meet a 20% reduction target of scope 1 and 2 emissions by 2020. These specific mitigation strategies will be discussed in section 5.

## 5 MITIGATION STRATEGIES

This climate plan focuses primarily on the time period between 2010 and 2020. As modeled in Figure 7, there are 5 strategies for reducing emissions to 14,083 mtCO<sub>2</sub>e by 2020 that are quantified: greening the grid, high efficiency buildings, energy conservation-behavioral changes, energy efficiency projects, and renewable energy. Carbon offsets, and Renewable Energy Credits (REC), while not quantified in the graph, are included in the mitigation strategies described in detail below. In the plan, we have included a section on Greening of State Government Executive Orders, since these are shaping UCCS strategies from 2007-2012.

### A. GREENING OF STATE GOVERNMENT – SHORT TERM

Greening of State Government Executive Orders D011 07 and D012 07, signed by Governor Bill Ritter, Jr., mandates that state government will reduce energy consumption, increase the use of renewable energy sources, increase the energy efficiency and decrease the environmental impact of the state vehicle fleet, implement environmental purchasing standards and reduce waste and increase recycling.

Specifically the Governor's Executive Orders call for:

- 20 percent energy intensity reduction
- 20 percent reduction of paper consumption
- 10 percent reduction in water consumption
- 25 percent volumetric reduction in petroleum fuel use
- A “zero-waste” goal for all construction projects and the operations of all facilities

All of these reductions are from a baseline of fiscal year 2006. While significant strides have been made toward some of these goals, a strong push is needed to achieve goals by 2012. UCCS is challenged to meet volumetric goals as student FTE has been increasing at an average rate of 3% per year requiring the use of more resources. In some cases, we are tracking progress from a resource use intensity per student FTE to account for this growth. A brief summary of the progress towards these goals follows.

#### **Energy**

Energy use intensity showed a downward decline between 2006 and 2008 (Figure 8). 2009 showed a small increase and slightly exceeds the target for this year. The university will need to significantly increase efficiency in existing and new buildings in order to meet the twenty percent reduction by 2012.

#### **Recommendations**

- Designate an energy manager to direct selected energy projects, capitalize on savings opportunities with the Building Automation System, and integrate energy and water efficiency strategies into new construction and renovations,
- Determine funding source to pursue energy projects needed to reduce emissions,
- Develop energy benchmarks for each building and monitor progress in energy reduction.

#### **Water**

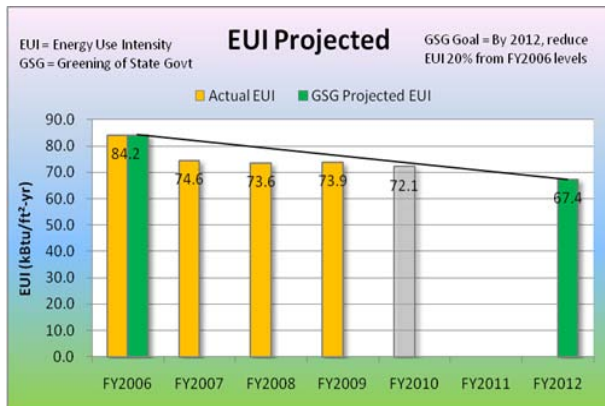
Water use decreased significantly from 2006 to 2007 and was well under the 2012 target of a 10% reduction (Figure 9). However, since 2007, water use has steadily risen and if unchecked, will

exceed the 2012 target in the next two years. In 2009 a campus wide toilet retrofit to 1.6 gallons per flush with dual flush valves was completed. One eighth gallon urinals were also installed. Water costs will increase by 12 percent in 2010 and again in 2011, making water conservation a potentially significant source of cost savings.

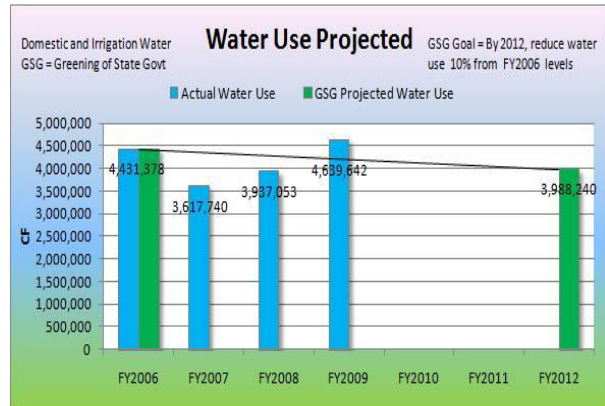
### **Recommendations**

- Retrofit campus with 0.5 gpm aerators to match standards in LEED buildings on campus
- Invest in smart irrigation system as this is the most significant use of water

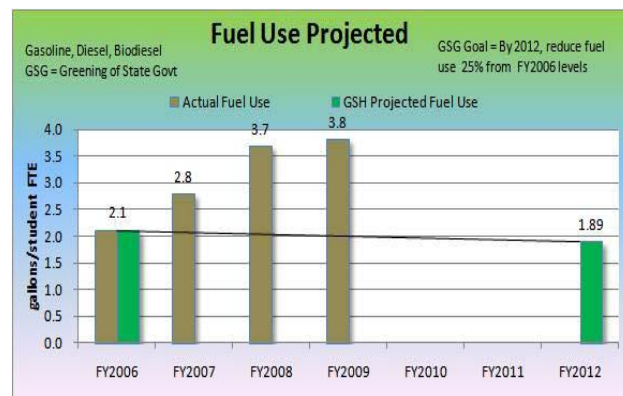
**Figure 8. Energy Use Intensity GSG Goals**



**Figure 9. Water Use GSG Goals**



**Figure 10. Petroleum Use Intensity GSG Goals**



### **Fuel use**

Fleet fuel use has increased steadily from 2006 to 2009 and well exceeds the GSG Executive Order targets for each year based on both a volumetric measurement and a fuel use intensity by FTE (Figure 10). Part of the reason UCCS saw an increase in fuel use was due to a significant decrease in parking spaces since 2006 on the main campus and a move toward greater reliance on a satellite parking lot (4 Diamonds). This in turn necessitated increased shuttle service provided by the university. Meeting the 25% reduction target will require significant planning by the campus to include Public Safety and Physical Plant departments.

### **Recommendations**

- Resize vehicle fleets,
- Ensure efficiency in trips for equipment and supplies purchases,
- Pursue more electric and alternative fuel vehicles especially for the shuttles
- Incorporate non-mechanized transportation when possible.

### **Paper use**

Though paper use is not currently tracked reliably across the campus, there have been some significant reductions. Information Technology, which controls many of the computer labs on campus, has instituted several programs that have significantly reduced paper use. The first was to set all printers and computers to double-sided printing as the default. The second initiative was Paw Prints pay-per-page printing in all of the computer labs. This initiative alone has reduced paper use by roughly 50% in the labs. Additionally, many processes and publications on the campus have gone paperless, further reducing paper consumption. Further tracking and measurement is needed to accurately gauge progress on this goal.

### **Recommendations**

- Encourage faculty members to require students to turn in double-sided papers, when possible
- Encourage use of 1-inch margins across campus instead of current 1.25 default, when permitted
- Continue to encourage that publications and internal processes, where possible, go paperless.

### **Recycling and zero waste**

Recycling is addressed in detail later in this report. A comprehensive recycling program was initiated in 2007. Rates for recycling went from 5% to 26% in that first year. Despite switching to single stream recycling in 2009, recycling rates remain at approximately a 26% rate.<sup>1</sup> “Zero waste” has been instituted as a concept and goal on the campus and several events including basketball games and an outdoor concert have included “zero waste goalies” to help direct waste and recycling efforts. Construction waste recycling has been very successful with an 89% recycling rate for the Recreation Center, 94% for Science & Engineering, 72% for the Gallogly Event Center, and a current rate of over 80 % for the Science building renovation.

## **B. SCOPE 1 AND 2 MITIGATION – TARGET 2020**

### **1. GREENING OF THE GRID**

UCCS currently purchases all electricity and natural gas from Colorado Springs Utilities, a municipal owned utility. The current mix of fuels for electricity is 69% coal, 19% natural gas, 9% hydroelectricity, 2% spot purchases (mix of natural gas, coal) and less than 1% wind. In 2010 the Renewable Energy Act (HB-1001) was passed in Colorado requiring a renewable energy standard of 30% renewable energy for the state by 2020. However, as a municipal utility, CSU is not required to

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<sup>1</sup> A partial reason for the lower rate despite single stream recycling is due to the change in the way weight is calculated. The rate for converting volume of single stream recycling to weight is lower than rate for paper, which is predominant in UCCS recycle stream.

comply. If CSU were to meet a 30 percent renewable energy standard, this would significantly assist UCCS in reaching targeted emissions reductions. It is important that UCCS participates in the Electric Integrated Resource Plan, starting in 2010, to develop long range energy plans for Colorado Springs.

CSU fuel mix plans for 2020 include the addition of wind generation of up to 3% (Figure 11). When combined with the current hydroelectricity, this will provide for a total of 15% renewable energy to the grid. In the UCCS mitigation model, the additional wind generation represents a 3% contribution to emission reduction goals. The hydroelectricity is already in place as of 2010 and is not shown separately in our strategies.

This projection does not include the biomass, biosolids, and municipal solid waste strategies that Colorado Springs Utilities is currently engaged and working to put in place. If successful, CSU will produce up to 350 MWhrs of energy from those combined sources (existing hydro, wind, and biomass), which will then be reflected in our climate mitigation strategies.

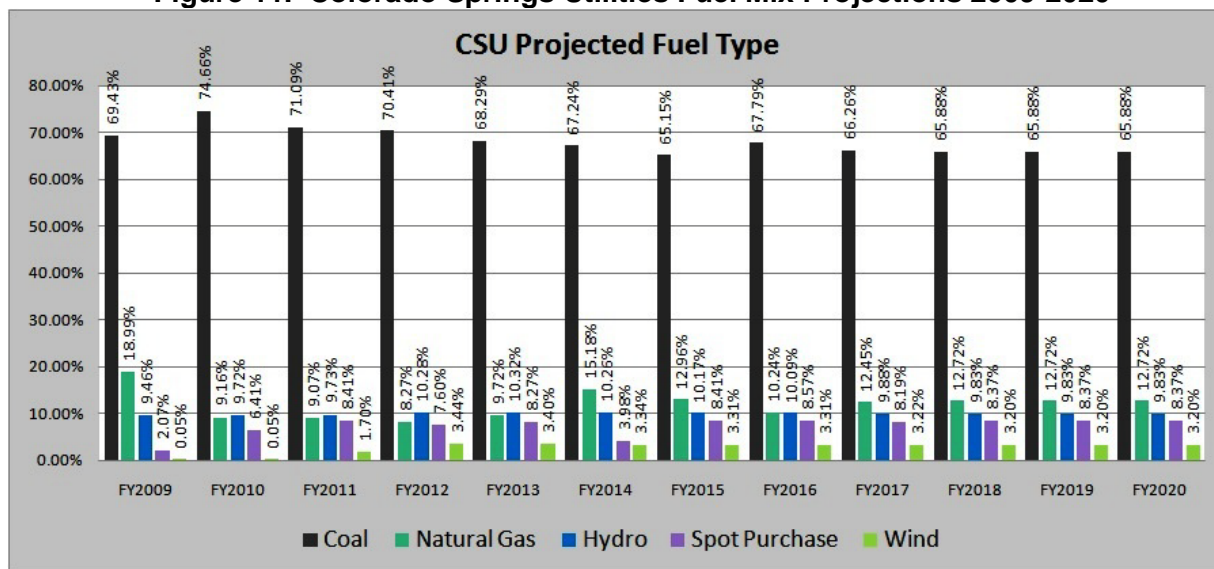
Additionally, Neumann Industries is in research and development of a clean coal process that may remove sulfur as well as 60-70% of CO<sub>2</sub> emissions from coal-fired power plants. However, the difficulty and expense in sequestering the resulting carbon may not make this a viable option in the near term.

The fuel mix for the electricity grid is crucial in the equation for UCCS to lower its greenhouse gas emissions. As the grid is greened in northern and central Colorado, universities in these regions will be at an advantage in pursuing their reductions in emissions in a cost effective manner. UCCS, with many other organizations in Colorado Springs, is actively working with CSU to pursue more renewable energy options for the grid.

### **Recommendations**

- UCCS should encourage and work with CSU and other organizations to pursue more renewable energy options to green the Colorado Springs grid.

**Figure 11. Colorado Springs Utilities Fuel Mix Projections 2009-2020**



Provided by Doug Anderson, Colorado Springs Utilities 2009

## 2. HIGH EFFICIENCY NEW BUILDINGS

UCCS, as part of the ACUPCC, has an official commitment for new buildings and major renovations to be Leadership in Energy and Environmental Design (LEED) certified at the silver level. Colorado Senate Bill 51-07 targets LEED Gold certification as a minimum standard for buildings that are 25% state funded. Since 2007, UCCS has excelled in LEED building with two new buildings achieving LEED Gold certification (Recreation Center, Science and Engineering building) and two buildings expecting LEED Gold certification (Gallogly Event Center, and the Science building renovation).

These buildings have targeted energy reductions in the 30-35% range compared to traditional buildings of the same function. This has been the design standard; however, in these editions of LEED, there has been no requirement regarding actual energy performance of the buildings once completed. Studies have indicated that many LEED buildings, despite being designed for higher energy performance, do not actually achieve that performance based on inadequate operating strategies, mistakes in construction, and insufficient maintenance. LEED 2009 has addressed this and future buildings designed to LEED standards will also have an energy performance measurement required to achieve certification.

In order for UCCS to include high performance buildings in the mitigation strategies, there needs to be a commitment to reaching much deeper into the energy efficiency design and performance credits to target a 40% reduction in energy use. An additional advantage of this strategy is that it will reduce operating costs of each of the new buildings.

### **Recommendations**

- Continue building to LEED Gold standards with a commitment to target 40% greater energy efficiency than ASHRAE 90.1 standard. Target a lighting intensity of 1W per square foot,
- Monitor all existing LEED buildings on campus to ensure than designed energy performance is being met and address inefficiencies where discovered,
- As buildings are renovated, ensure that energy efficiency retrofits are included to reach the highest energy efficiency possible.

## 3. ENERGY CONSERVATION - BEHAVIORAL

In this climate plan, energy conservation accounts for 7% of the reduction in emissions by 2020. This addresses the behavioral component of energy conservation and efficiency and primarily includes energy uses over which individual campus members have control: lights, computers, appliances, windows, and space heaters.

In 2010 the Green Team of the Sustainability Committee was established to focus on sustainability issues in campus operations. The primary focus of 2010 is to develop energy conservation campaigns and to target specific reduction goals for the campus. There will be a significant focus on housing, recognizing that the 900 students living on campus contribute significantly to the behavioral aspect of conservation.

In 2009 Chancellor Shockley-Zalabak, motivated by the statewide fiscal challenges, charged the creation of the Mandatory Utility Containment Committee, MUCC, to provide integrated, comprehensive strategies to reduce utility costs on the campus. Comprised of facilities staff and directors throughout the campus, this committee continues to examine technical, operational, and behavioral strategies to reduce energy and water use. Some of the specific changes implemented include a custodial switch from nights to days to reduce lighting use, establishing setpoints for

heating and cooling at 71 and 77 degrees, accepting a policy of appropriate summer clothing, establishing a guideline for Energy Star appliances wherever possible, and confirming building schedules to match HVAC and lighting. Additionally, staff building proctors have been identified in each of the buildings to assist with conservation strategies and provide feedback to facilities staff regarding inefficiencies.

### **Recommendations**

- Strengthen MUCC committee to expand campus reach, select yearly targets and projects, and provide quarterly feedback to administration,
- Work with staff and faculty to reduce space heater use and replace with lower wattage equipment where necessary,
- Address energy use in housing
  - Incoming students will receive information about Energy STAR appliances, power strips, compact fluorescent bulb, and a campus culture of sustainability and energy conservation in housing newsletters,
  - Presentations will be given by sustainability office to all housing students at the beginning of fall semester regarding energy and water conservation and recycling
  - An “eco-reps” program, student leaders who model and promote environmentally responsible behaviors in the residence halls and other university facilities by educating their peers, should be considered and implemented,
  - Sustainability presentations are being provided at Freshman Orientation to encourage culture of conservation.

## **4. ENERGY EFFICIENCY PROJECTS**

### **Accomplishments to Date**

Energy efficiency represents the largest part of emissions reduction strategies (30%) besides renewable energy, and has the potential to provide significant cost savings over the long term. UCCS has made significant progress since 2005 in pursuing energy efficiency projects and reducing the energy intensity of the campus during a time of significant building and student growth.

Subsequent to a comprehensive building energy audit in 2003, UCCS issued \$1.3 million in long term bonds to pursue energy and water projects. Projects started in 2006 and funds are now 95 percent expended with specific plans for the remaining funds. Colorado Springs Utilities also provided an energy audit on four buildings and provided low and no-cost recommendations for energy savings. Projects to date have included a campus-wide lighting retrofit, a comprehensive Digital Direct Controls system installation, a replacement chiller with evaporative pre-cooling, boiler isolations valves, water autoclaves, LED exit signs, compact fluorescents, lighting timers, envelope improvements to a building renovation project to reduce solar gain, a campus-wide toilet retrofit from 3.5 gallon to 1.6 gallon tanks and flush valves, the replacement of an inefficient domestic hot water heater and other miscellaneous lighting and HVAC projects. UCCS secured a number of rebates from Colorado Springs Utilities to help finance projects. These energy projects have contributed to a consistent downward trend in energy use intensity in UCCS buildings.

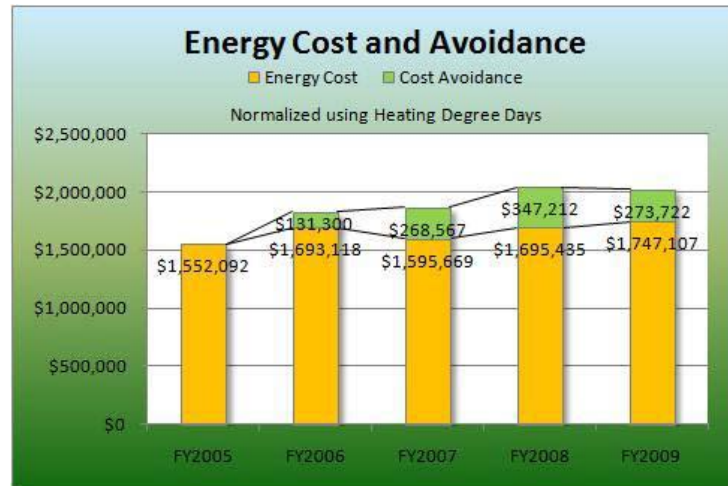
### **Cost Analysis**

### **Figure 12. Energy Cost Avoidance FY 2005-2009**



The following graph (Figure 11) is an estimate of cost avoidance using FY05 as the base year. It shows an estimated total cost avoidance of more than \$1 million over the past five years. We will continue to track these data as part of the MUCC monitoring process.

Note: This graph does not include the 3650 North Nevada property acquired in 2007, which is presently used very lightly as a warehouse.



### **Energy Efficiency 2010-2020**

Energy efficiency projects account for 30%, or 3333 mtCO<sub>2</sub>e, of the planned emissions reductions by 2020. The campus is organized by two major areas of management and funding, General Fund buildings, which directs the academic and administrative buildings serving academic functions, and Auxiliary Services, which are student funded and include housing, police, recreation, and event buildings. General Fund buildings which include academic and administrative programs, account for 58% of energy use and emissions. Auxiliary Fund buildings account for 42% of energy use and emissions.

For organizational purposes, we have assigned the planning for the 2010-2020 time frame into General Fund, Auxiliary Services, Information Technology, and Public Safety. This equates to approximately 1400 mtCO<sub>2</sub>e to be contributed by Auxiliary Fund buildings and 1933 mtCO<sub>2</sub>e for General Fund buildings.

UCCS has a number of projects identified for improved energy management, but has not yet developed a detailed account of the associated economics. Only with the detailed cost and energy saving information can a proper business model be developed. Costs and emission mitigation quantities highlighted in this section are estimates that will need further detailed budget and engineering studies before pursuing individual projects. Strategies from each of the organizational units are provided below.

### **General Fund Strategies**

In the past five years, many energy and water projects were completed that can be considered the "low hanging fruit." While there are still some low cost strategies to reduce energy consumption that are currently being pursued, increasingly UCCS will need to look for more comprehensive retrofit projects to reach energy and emissions reduction goals. In 2009, to identify the next deeper round of energy adjustments and retrofits, UCCS secured the services of an architectural engineering firm to conduct energy audits on five of the most energy intensive buildings: University Hall, the Engineering & Applied Sciences Building, Columbine Hall, the Kraemer Family Library, and Aspen Hall and the Lodge. Some of the planned conservation projects identified in this Climate Plan are recommendations from this audit.



In total, approximately 1500 mtCO<sub>2</sub>e in emissions reductions have thus far been quantified from general fund buildings and parking lot light retrofits. Projects analyzed include:

- Lighting (460 – 550 mtCO<sub>2</sub>e reduction)
- HVAC (95-200 mtCO<sub>2</sub>e reduction)
- Retrocommissioning (250-300 mtCO<sub>2</sub>e reduction)
- Engineering building renovation (550-650 mtCO<sub>2</sub>e reduction)
- Information technology projects – emission information not yet available

A partial list of these projects is found in Appendix A. The identification of projects is an iterative process and facilities teams are continuing to look for creative ways to reduce energy use. The projects and correlated savings in both energy and carbon are high level estimates. While lighting projects are relatively easy to quantify, the larger HVAC projects will require a higher level of detail by professional engineers and contractors.

There are numerous additional projects that have been identified, but need further evaluation. Efforts to identify and quantify further emission reduction projects are currently in process and will continue throughout 2010.

### **Fleet Strategies**

The Facilities Services fleet's average age is ten years old. Due to age and less efficient technology gas mileage currently averages 8.25 miles per gallon per vehicle. During a 12 month period approximately 5685 gallons of fuel are used to support the Facility Services activities. In the climate planning process, strategies were examined that included transitioning to more fuel efficient vehicles and utilizing electric vehicles where possible. The change in fleet would reduce yearly gasoline consumption by 1943 gallons per year with a carbon savings of 17 mtCO<sub>2</sub>e and a dollar savings of approximately \$20,000 in gasoline and maintenance. While transitioning to all new vehicles in one shot would be prohibitively expensive, it is recommended that fuel efficiency and alternative fuels be considered at every opportunity for replacement.

### **Auxiliary Fund Strategies**

#### **Recent Accomplishments**

A number of energy conservation and sustainability projects have been completed in auxiliary funded buildings. These include de-lamping in meeting rooms, installing motion sensors in meeting rooms and the ballroom for HVAC control, retrofitting metal halide fixtures with dimmable fluorescent fixtures in the gymnasium, and continuing to replace T-12 lamps with T-8 lamps. Additionally, roof insulation was upgraded on the UC and the roof was replaced with white TPO to prevent heat absorption. To conserve materials and water, toilets and urinals have been retrofitted with low flow fixtures and water bottle fillers have been installed on fountains in the UC and the Recreation Center.

#### **Future Plans**

- Will establish revolving loan fund for auxiliary energy projects
- Potential removal of every other or every third hallway light in Summit & Alpine Village
- Low flow showerheads in all residences
- Install switches to operate Lodge kitchen exhaust fans only during times of operation.
- Power down HVAC in Keystone room that is no longer a computer lab

- Complete review and upgrade with Long & Assoc of the Summit & Alpine Village HVAC systems
- Address lighting in Monarch Lobby with occupancy sensors or timers
- Exploring ReRev type system for harnessing electricity from exercise machines

### **Information Technology (IT) Strategies**

#### **Recent Accomplishments**

- Upgraded campus lab computers with new Energy Star PC's. In addition the timeout options and shut down processes have been adjusted for decreased electrical usage.
- Moved multiple servers to a bladed solution with a Storage Area Network (SAN) interface. This dramatically cuts the amount of power consumption and space needed to run the servers. The SAN option allows for increased file storage to a more compact and efficient system again allowing for reduced power usage.
- Created a Paws Pay-per-Page printing system in all computer labs on campus for students. This project has significantly reduced the amount of paper used at UCCS.

#### **Future Plans**

- Upgrade the campus network to the next generation of networking equipment, which will greatly reduce power consumption of the network. IT is currently working with vendor to quantify energy savings.
- IT will implement a voice-over -IP phone system that will cut electrical cost by eliminating the current Private Branch Exchange system. IT is working with vendor to quantify energy savings.
- Thin client systems are currently being researched to determine viability and reduced energy and materials use.

### **Public Safety**

#### **Recent Accomplishments**

Public Safety has converted two of their patrol vehicles to hybrids and is planning to convert 2 more vehicles in 2010. Shuttle busses run on 5% biodiesel and when appropriate 20% biodiesel. A sustainable transportation intern position was created to help coordinate and provide education for multimodal transportation. Bike racks and bike locker quantities have doubled as has the number of bike patrol officers. In 2009, a bike loan program was initiated to encourage more bicycle ridership. Finally, Public Safety continues to have an Alternative Work Schedule program to reduce the number of trips to the campus each week.

#### **Future Plans**

- Convert two more patrol vehicles to hybrids – (16 mtCO<sub>2</sub>e reduction)
- Double the amount of bike patrol officers – (14.76 mtCO<sub>2</sub>e reduction)
- Ban patrol vehicle idling in winter when parked-unattended – (.43 mtCO<sub>2</sub>e reduction)
- Carpool to local trainings – (.89 mtCO<sub>2</sub>e reduction)
- Upgrade lighting (potentially with LED) in the Parking Garage – (89 mtCO<sub>2</sub>e reduction)
- Upgrade appliances to Energy Star – (.5 mtCO<sub>2</sub>e reduction)

- Implement fleet ridefinders program - Project one ride per month saved by matching persons using state fleet vehicles who are going to same location.
- Partner with Colorado Springs Metro (city bus service) for free or discounted bus passes

### **UCCS Bookstore**

The UCCS bookstore has been a leader in sustainability both in practices within the store and offices as well as in product selections. They have targeted recycled products such as computer accessories, clothing, and numerous gifts. They have also partnered with Conservation Hardware to provide energy and water conservation products and education for the campus community.

## **5. RENEWABLE ENERGY**

### **A. EXISTING RENEWABLE ENERGY IN PORTFOLIO**

In 2008, UCCS installed a 68-panel solar thermal system to heat the Recreation Center swimming pool. The system provides approximately two-thirds of the energy needed to heat the pool and roughly 7% of the total building energy use.

In 2009, the university installed a 13.6kW photovoltaic thin-film laminate system on the new Science & Engineering building. Contribution of electricity for the first 10 months equals 16,393 kWh and a total emissions reduction of 11.7. mtCO<sub>2</sub>e. Because the university received solar rebates from Colorado Springs Utilities in order to help fund this project, we are unable to account for this as a reduction to our carbon footprint. While this is a very small contribution to the total energy use of the building (less than 1%), it is an important demonstration project that is available for students to analyze.

In 2008 students voted to support a \$5 fee per student per semester to fund the purchase and installation of photovoltaic systems on campus. The fee provides approximately \$100,000 a year, which after funding a portion of the Science & Engineering building system, the only installation to use these funds thus far, leaves \$450,000 for future installations. The Science building renovation is planning to incorporate a photovoltaic system in the range of 25Kw depending on available rebates in 2010.

As part of the process to earn LEED Gold certification for the Gallogly Events Center, Renewable Energy Credits (RECs) were purchased in 2010 to cover 70% of two years of expected electricity use, or 265,878 kWh per year. Also in 2010, REC's were purchased to account for 100% of the building energy use of Centennial Hall (formerly the Science Building) for 2 years in the amount of 833,680 kWh per year. This will be accounted for in future greenhouse gas inventories. The campus will need to decide whether to continue purchasing these credits when the contracts end in two years. Renewable energy in the UCCS portfolio contributes to the reduction of 850 mtCO<sub>2</sub>e for electricity and 85 mtCO<sub>2</sub>e for natural gas. This contributes 935 mtCO<sub>2</sub>e of the needed 6,332 mtCO<sub>2</sub>e to meet the 2020 goal assuming that these REC's are continued until 2020.

## B. RENEWABLE ENERGY 2010-2020

### Solar Energy

A preliminary assessment to identify the capacity for solar installations on building roofs as well as ground mounts on top of Austin Bluffs was conducted by a solar installation company. A preliminary estimate provides for a total of 87,400 sq. feet of potential roof surface for solar installations to equal roughly 1.2 mW. This represents approximately one fifth of the electricity demand for the campus. The area on top of the bluff, 2.7 acres, could also accommodate approximately 1.2 mW of solar capacity. At an installed price of \$5 per watt (2009 quote), the cost to pursue all buildings would be \$6,386,600. There is not yet enough information to estimate the cost for the ground mount system on the bluff.

**Table 3. Solar locations, potential systems, and installed costs 2009**

Location/Building	Square Feet Available for Solar	# of 220 Watt panels	Size of system (kW)	Estimated cost for system(\$) (at \$5 per Watt)
Science & Engineering	8750	580	127	635,000
Columbine Hall	13,600	900	198	990,000
Dwire Hall	12,800	850	187	935,000
University Center	6,000	400	88	440,000
Gallogly Events Center	10,000	660	145	725,000
Kraemer Family Library	33,000	2220	488	2,440,000
Cragmor Hall	3250	216	47	235,000
Bluffs behind campus	2.77 acres	5608	1.277	6,386,000

The price of solar is expected to continue to decrease with growing production. As of May 2010, there are now 440 solar module prices below \$4.00 per watt.

As a non-profit, the only viable way for UCCS to pursue systems at this scale is to utilize a third party lease purchase agreement where a for-profit business can take full advantage of federal tax incentives, accelerated depreciation, and utility rebates for production. This option has previously been unavailable due to a City Code provision prohibiting third party providers of energy in Colorado Springs. Currently, CSU has indicated this hurdle can be accommodated by legally "inserting" CSU into the power sale ownership chain.

The third party purchase agreements are also highly reliant on procuring sufficient rebates for production. 2010 rebates were \$3.00 per watt, and limited to 25kW systems. For 2010, CSU had a total of \$600,000 to provide in rebates, which were fully committed in January.<sup>2</sup> Without being able to qualify for federal tax incentives, account for depreciation, or pursue rebates for systems larger than 25kW, UCCS is limited in its ability to pursue onsite solar as a viable way of reducing emissions. Additionally, if UCCS is using a third party model, there will need to be consideration of the transfer of Renewable Energy Credits back to the campus, preferable before 2020, so that the emissions reductions can be counted toward the UCCS inventory.

UCCS is currently collaborating with CSU to explore options for larger third party systems on the campus or within the community. There are numerous entities such as colleges, K-12 schools, military installations, and citizens groups that are interested to increase the availability of renewable energy in the city.

### **Wind Energy**

UCCS is involved in several collaborative processes to potentially secure wind power for the campus. One project deemed a "Higher Education Consortium" seeks to connect the campus to a large off-campus wind energy farm and directly receive that electricity transmitted through Xcel Energy, CSU and perhaps other providers in order to power the campus.

Under the so-called "Strategic Investor Flip" approach, UCCS and the wind farm developer would form a joint venture but the project would be majority funded by a third party (UCCS could put more or less equity into the project in year one; a minimum of 1 percent appears normal). The joint venture (UCCS and the developer) would contract to buy power at a predetermined price for up to ten years. At the end of that period, UCCS would have the option (or obligation) to become a majority owner in the project at a predetermined fair market value. UCCS would then own and operate some or all the entire wind farm. UCCS has entered into a Consortium Agreement with several other Colorado campuses to aggregate interests and resources in pursuit of this goal.

Under another approach, UCCS might co-mingle capital with the other universities and establish an equity position in a large wind farm from the outset. This typical corporate structure arrangement features all the capital coming from the universities, working with a developer to fund, build and operate the wind farm. No third party funding would be considered. However, this approach may inevitably cost more if no method of reaping the tax benefits by public entities is identified.

### **Geothermal**

As UCCS continues to grow, geothermal or geo-exchange energy systems should be considered. School District 11 has used this strategy successfully and continues to add more systems for its schools. The challenge will be up front capital costs. UCCS will need to investigate the viability, placement, and financing options for this strategy.

### **Recommendations**

- Continue to develop a capacity map for photovoltaic installations,
- Identify potential areas and viability for geothermal exchange technology,

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<sup>2</sup>. In June of 2010, funds were committed from Colorado Springs Utilities for a \$51,000 rebate for a 20 kW photovoltaic system for the Science Building.

- Work with Colorado Springs Utilities to facilitate financing options for lease purchase agreements for renewable energy. Otherwise the main option would be to pay prohibitive prices to purchase renewable energy directly, and
- Establish a renewable energy working group to target funding, explore opportunities, and work on contracts.

## 6. CARBON OFFSETS

Carbon offsets are investments made to counteract activities such as electricity use, or vehicle use by funding projects to compensate for emissions occurring at another source. Purchasing carbon offsets is intended to fund projects that reduce the overall amount of carbon dioxide in the atmosphere including actions such as generating energy from renewables, capturing wasted energy for cogeneration, modifying a power plant or factory to use fuels that produce less greenhouse gas emissions, or capturing carbon dioxide in forests and agricultural soil.

Currently, carbon offset costs vary with different sponsoring agencies from a low of \$2.75 per mtCO<sub>2</sub>e to a high of \$29.00 per mtCO<sub>2</sub>e. The Colorado Carbon Fund, which supports new verifiable greenhouse gas reduction projects developed in Colorado, currently charges \$20 per mtCO<sub>2</sub>e.

The Climate Action Committee has deemed carbon offsets a strategy of last resort, after all projects that benefit the campus financially and environmentally have been exhausted. The return on investment of on-site energy efficiency and renewable energy projects, which would be used to offset emissions, is significantly better.

## 7. RENEWABLE ENERGY CERTIFICATES (REC)

Renewable Energy Certificates (REC) are tradable, non-tangible commodities providing proof that electricity was generated from an eligible renewable energy resource. The owner of the REC can claim to have purchased renewable energy. For every 1,000 kWh a green energy provider, such as a solar farm, produces, it is credited with one REC. This energy is then fed into the electrical grid and the REC can be sold. Thus, purchasing RECs increases the total amount of renewable energy being produced even though the “green electrons” are not flowing directly to the REC purchaser.

RECs, at approximately \$ 0.00211 per kWh, are initially one of the least expensive ways to claim a reduction in emissions after energy conservation measures. However it is a forever recurring cost and the preference of UCCS, as articulated by the Climate Action Committee, is to rely more on onsite generation, and direct purchases into renewable energy resources rather than the purchase of RECs. UCCS has purchased RECs for 70% of the building energy use for the Gallogly Events Center for the two year period of 2010-2011 and is considering doing the same for the Science Building renovation, a LEED Gold building. It is a strategy that will continue to be an option while recognizing that projects that produce renewable energy on site are preferred.

## C. SCOPE 3 MITIGATION

### 1. TRANSPORTATION: COMMUTING AND UNIVERSITY FLEET

Transportation is a significant part of UCCS Scope 3 emissions. A UCCS transportation survey revealed that 87% of the campus community commutes to the campus in single occupancy vehicles.

UCCS is significantly challenged to reduce emissions correlated with commuting to the campus. In 2009 bus service was reduced from five routes to two routes. After a 2010 failure of a property tax

increase on the ballot, city bus transportation may disappear altogether. Also, the university is located on top of a large hill, creating a real and perceived barrier for the campus community to walk or ride their bicycles to campus. In 2007 the Public Safety Department created the position of Sustainable Transportation Intern to provide alternative transportation education, and to coordinate programs for bicycle, public transportation, and pedestrian commuting.

Since then, and due to city budget issues, UCCS has focused on improving the bicycle, pedestrian, and energy efficient vehicle infrastructure of the campus. The number of bicycle racks has been increased, several bicycle lockers have been added, and shower facilities are being included in all new buildings. UCCS started a bike library program in fall 2009 to allow students free access to bicycles for 10 days each semester and a bicycle repair shop was added to the Recreation Center. A pedestrian spine has been completed to traverse the campus and an underpass was constructed to provide safe bicycle and pedestrian passage across a six-lane Nevada Avenue. All shuttle busses on campus are outfitted with bicycle racks. A designated high efficiency vehicle parking spot was added as part of the LEED certification for the Gallogly Events Center.

Carpooling options are offered on the UCCS website through a city-run carpool database. Students can update their transportation needs as their class schedules change. Campus parking permits can be shared among carpooling students thus providing a financial benefit in addition to the environmental advantage.

### **Recommendations**

- Support mechanisms such as the development of Regional Transit District (RTD) to reinstate bus service in the community and to the campus,
- When bus service is reinstated, work with bus administration to provide discount tickets to campus community members,
- Provide a rental car option for students so that they can consider leaving their cars at home.
- Provide a guaranteed ride home service for carpoolers,
- Support the proposed trolley route to connect to campus,
- Provide more preferred parking for hybrids or low emission vehicles,
- Separate parking lots from bicycle and pedestrian thoroughfares on campus.

## **2. WASTE MINIMIZATION AND DISPOSAL**

### **Waste Minimization**

As part of the ACUPCC climate commitment, UCCS selected waste minimization as one of the tangible actions to reduce GHG emissions. Paper waste minimization has provided estimated savings of more than \$50,000 per year.

Specific initiatives that have been targeted by UCCS are:

- Replacing production of paper materials with online alternatives wherever possible (pay advices, billing, annual budget reviews)
- Implemented campus printing initiatives which prohibit or discourage unlimited printing in computer labs and copy rooms. Paws Pay for Prints implemented in computer labs and Library reduced paper use by 50%
- Duplex printing set as default in computer labs

- Offer discounts or other incentives for using reusable hot and cold mugs in campus dining operations
- Encourage an informal office supplies exchange on campus
- Provide Goodwill trailer at student housing move-out

### **Recycling**

UCCS initiated its first comprehensive recycling program in 2007 with an initial goal of recycling 26% of its waste. Recycling bins are paired with all waste bins throughout the campus including outside receptacles and those for athletics. Numerous educational efforts have been undertaken to raise awareness and promote effective recycling.

In January 2009, UCCS moved to single-stream recycling, which allows all recyclable materials to be put into a single bin, thus eliminating the need to separate the waste. Single-stream recycling typically improves recycling rates by as much as 30%. This has not been the case at UCCS and more work is needed to educate and motivate the campus community to reduce waste and recycle more.

UCCS has participated in RecycleMania for the past three years. RecycleMania is a nationwide recycling competition among more than 400 colleges and universities. In a ten-week period, campuses compete in different contests to see which institution can collect the largest amount of recyclables per capita, the largest amount of total recyclables, the least amount of trash per capita, or have the highest recycling rate.

### **Construction Waste Recycling**

Construction waste recycling not only keeps materials out of local landfills, it helps to organize construction staging areas and reduces waste costs. UCCS has made great strides in this area with new buildings and renovations. The Recreation Center (2007) achieved an 89% recycling rate, the Science & Engineering Building (2009) achieved a 94% recycling rate, Gallogly Event Center (2010) 72%, and the Science Building Renovation is currently achieving more than 80% recycling of construction materials. Additional recycling efforts include the reuse of 5000 tons of asphalt millings from an adjacent urban redevelopment project. The millings will be used to create a new road to the Heller property on the UCCS campus.

### **Recommendations**

- Increase education efforts and incentives to achieve significantly higher rates of waste diversion,
- Work with vendors to reduce packaging,
- Work with food service provider to use either real chinaware or carryout materials that are made from recycled materials, are compostable or recyclable,
- Adopt CU Green Purchasing Guidelines,
- Ensure that contractors, even for small projects, are provided with targets for construction waste recycling and monitor this process closely throughout construction.

## **3. PROCUREMENT**

The university is part of the four-campus University of Colorado system and is served by the Procurement Services Center (PSC). The PSC maintains a Sustainable Purchasing Program that serves the University community “by educating, advising, and engaging students, faculty and staff in the application of ecological principles to achieve Sustainable Purchasing solutions.” Current initiatives include increasing the percentage of purchases of environmentally friendly goods and



services, incorporating sustainable purchasing goals into purchase specifications, and establishing a sustainable purchasing resource database.

While the PSC cannot mandate sustainable procurement, they do provide sustainable purchasing guidelines to assist departments in making “green” purchases of goods and services. UCCS strives for sustainable procurement wherever possible, including purchasing environmentally friendly (Green Seal certified) cleaning supplies and recycled paper.

### **Recommendations**

- Encourage all departments to adopt the CU system Sustainable Purchasing Guidelines,
- Purchase at least 30% recycled paper and environmentally friendly supplies and materials,
- Reduce procurement and consumption where possible; for example, replace paper processes and forms with electronic versions.

## **4. FOOD SERVICES**

Sodexo is currently the sole provider of food services at UCCS and endeavors to provide more sustainable food and services to the campus. Sodexo’s initiatives have included providing products from local farmers and growers when possible, offering some organic and fair trade coffee, giving discounts for customers who provide their own cold or hot cup, transitioning to compostable utensils and supplies for catered events, and assisting with the establishment of a campus organic garden. Sodexo has also provided local, organic meals for events and offers a vegan meal daily.

### **Recommendations**

- Encourage Sodexo to purchase more local, organic food and provide more vegetarian food choices and track increases of these items over time
- To reduce food waste and water use, explore options for reducing tray use
- Reduce bottled water on campus and provide more water bottle refill stations,
- Partner with Sodexo to compost food services’ waste that can be used on the campus organic vegetable garden as well as landscaping.

## 6 EDUCATION AND RESEARCH

In 2007 a team of faculty, staff and students was assembled to address the challenge of incorporating sustainability and climate change into the curriculum as well as provide extracurricular opportunities for students to learn. At that time, UCCS had already initiated a multidisciplinary minor in Sustainable Development and sustainability was a significant focus in the undergraduate Geography and Environmental Studies program. In order to better define sustainability and climate literacy, the team referred to the document “Education for Climate Neutrality and Sustainability”, developed by ACUPCC<sup>3</sup>. The excerpts below address working definitions of climate and sustainability literacy that are being used by UCCS and includes identification of target audiences.

### **Sustainability Literacy Defined**

In the 1995 Essex Report to President Clinton’s Council on Sustainable Development, education leaders provided these outcomes for student understanding:

- how the natural world works;
- the interdependence of humans and the environment;
- how to assess the effects on humans and on the biosphere of human population dynamics; energy extraction, production and use; and other human activities such as agriculture, manufacturing, transportation, building and recreation;
- the relationship of population, consumption, culture, social equity and the environment;
- how to apply principles of sustainable development in the context of their professional activities;
- technical, design, scientific and institutional strategies and techniques that foster sustainable development, promote energy and natural resource efficiency and conservation, prevent and control the generation of pollution and waste, remediate environmental problems, and preserve biological diversity;
- social, cultural, legal and governmental frameworks for guiding environmental management and sustainable development; and
- strategies to motivate environmentally just and sustainable behavior by individuals and institutions.

### **Climate Literacy Defined**

Andy Jorgensen and David Blockstein at the National Council for Science and the Environment (NCSE) suggest that climate literacy involves:

1. understanding the *scientific basis of climate change* (both the workings of the climate system, and the anthropogenic disturbances to the system);
2. understanding the *environmental, economic and social consequences* of rapid global climatic disruption;
3. understanding the various *means by which the anthropogenic influence can be limited*, the *complications* inherent in utilizing these means, the *uncertainty* about various solutions; and
4. preparing to be an *active participant in climate solutions*, whether as a climate solutions professional or simply as an engaged citizen.

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<sup>3</sup> Hattan, Amy Seif. Principal Author, with American College and University Presidents Climate Commitment, ACUPCC. “Education for Climate Neutrality and Sustainability” April 2009, v1.0.  
[http://www2.presidentsclimatecommitment.org/html/documents/EducationforClimateNeutralitySustainability\\_2009.05.07\\_finalWEB.pdf](http://www2.presidentsclimatecommitment.org/html/documents/EducationforClimateNeutralitySustainability_2009.05.07_finalWEB.pdf)

### **3 levels (audiences) of sustainability and climate education**

ACUPCC also identified 3 levels of sustainability and climate education to most effectively target students. These are:

“Citizens” – the typical student who will not become an environmental professional, but needs to understand climate change, its causes, consequences and solutions as part of becoming an informed and active citizen.

“Environmental experts” - students majoring in an environmental field, who need to understand climate change as the context in which they will be operating regardless of their environmental career.

“Climate Solutions Professionals” - students whose career pathway will center on developing and implementing solutions for mitigation and adaptation.<sup>4</sup>

This rubric of what constitutes sustainability and climate literacy and the levels of desired or necessary literacy is helpful to develop education strategies. While the majority of our students currently fall in the “citizen” category, all audiences are represented and increasingly UCCS students are searching for deeper sustainability knowledge and skills to be competitive in their chosen fields. UCCS is committed to addressing these three levels of sustainability and climate literacy, depending on the students’ academic focus and career goals.

In 2010 the sustainability office partnered with Dr. Stephanie Blake, a professor in the Communications Department, to lead focus groups on sustainability and climate literacy. This work is being used to further develop a comprehensive survey to reach the student body and establish a baseline assessment of sustainability. This will ultimately help to establish what students already know, how likely they are to act based on that knowledge, and to identify in which of the three audience categories they fall.

## **A. CURRICULUM**

### **Geography and Environmental Studies, B.A. and M.A.**

Current offerings in sustainability and potentially climate change include an undergraduate B.A. and graduate M.A. in Geography and Environmental studies. The programs include an Environmental and Sustainability Studies (ESS) track focused on preparing students to live sustainably on a finite planet. The ESS “emphasizes an array of geographical topics designed to address the needs of the 21st century: how to identify, connect with, and preserve certain places; what it means to value and conserve resources; and whether we should broadly embrace new goals of environmental restoration.”

### **Sustainable Development Minor**

Established in 2006, the Sustainable Development (SD) Minor is an interdisciplinary program involving more than 55 courses in sustainability and environmental studies from departments and colleges across campus. Courses emphasize experiential, project-based and service learning. The

<sup>4</sup> Hattan, Amy Seif. Principal Author, with American College and University Presidents Climate Commitment, ACUPCC. “Education for Climate Neutrality and Sustainability” April 2009, v1.0.  
[http://www2.presidentsclimatecommitment.org/html/documents/EducationforClimateNeutralitySustainability\\_2009.05.07\\_finalWEB.pdf](http://www2.presidentsclimatecommitment.org/html/documents/EducationforClimateNeutralitySustainability_2009.05.07_finalWEB.pdf). pp. 22-24.

minor is “designed to prepare students for the challenges and obligations of the 21<sup>st</sup> century, specifically by contributing to UCCS and local organizations on issues relating to the environment and social equity, promoting economic vitality, and recognizing civic responsibilities both at home and abroad.”

### **Energy Science Minor**

The Energy Science Minor is currently being revitalized. “The Energy Science program is intended to be taken... with various technical and non-technical degrees. Energy Science courses are intended to supplement degree programs including but not limited to physics, geography, geology, engineering and economics and prepare students for careers in energy fields. Specifically, courses are offered in energy science, solar energy, wind energy, nuclear energy, and related fields such as remote sensing and climatology.” (UCCS Catalog, 2010-2011)

### **Other Initiatives and Programs**

Several learning communities have given significant focus to sustainability including the course “Racism and Environmental Justice”. Travel abroad trips to Guatemala and Panama, through the Geography and Environmental Studies department, have featured sustainability as well. In 2010, the UCCS Engineering Department partnered with Colorado Springs Utilities to provide energy audit training to our students through real audits for companies in the community. The sustainability office has worked with faculty members to sponsor many independent study projects.

The College of Letters Arts and Sciences, the largest college at UCCS, has selected sustainability as the main theme for the 2010/2011 academic year and is currently planning lectures and curriculum to increase sustainability literacy. In the 2011/2012 academic year the university is planning an “All Campus Reads” using a book on sustainability or climate change.

In support of campus sustainability goals, the Kraemer Library has added 300 monographs addressing various aspects of sustainability. Many of the library’s 25,000 online and print journals permit students and faculty to keep up-to-date with the latest research on sustainability and also on sustainability programs at other institutions of higher education.

The reach of these programs, some to be offered only for a one year period, thus far is not significant when compared to the entire student body. The committee that is currently reviewing general education goals is being asked to consider adding sustainability to the general education goals. This potentially represents the strongest strategy to reach the “citizen” group of students with sustainability and climate literacy.

## **B. RESEARCH**

Faculty and students at UCCS are involved in a diverse variety of sustainability research. Highlights of ongoing projects include:

- Gregory Plett - advanced battery technology for use in future electric vehicles, hybrid electric vehicles and extended range electric vehicles.
- Dan Dandapani - Colorado Springs Utilities initiative for smart grid development
- Tracy Gonzales – Sustainable Business Assessment Tool
- David Havlick – “Enhancing Teaching in Sustainability and Geography: Wind Power Pilot Study,” using data-logging anemometer on Austin Bluffs formation.

Highlights of published research on sustainability topics in the last 3 years by UCCS faculty include:

- Doyle, Martin W. and **David G. Havlick**. 2009. "Infrastructure and the Environment," Annual Review of Environment and Resources 34: 349-373.
- **Finnegan, Carol, Eric M. Olson** and Stanley F. Slater. 2009: "It's More Than Just Green to Be KEEN," Marketing Management Vol 19, March/April 2009.
- **Greenwood, Daphne** and Richard P.F. Holt. June 2008: "Institutional and Ecological Economics: Technology and Institutions in Economic Development," Journal of Economic Issues 42: 445-452.
- **Harner, John P.** 2007: "Globalization of Food Retailing in Guadalajara, Mexico: Changes in Access Equity and Social Engagement," Journal of Latin American Geography 6(2):33-53.
- **Havlick, David G.** and Martin W. Doyle. September 2009. "Restoration Geographies," Ecological Restoration 27(3): 240-243.
- Doyle, Martin W., Emily H. Stanley, **David G. Havlick**, Mark J. Kaiser, George Steinback, William L. Graf, Gerald E. Galloway, and J. Adam Riggsbee. 18 January 2008: "Aging Infrastructure and Ecosystem Restoration," Science 319: 286-287.
- **Havlick, David G.** 2007: "Logics of Change for Military-to-Wildlife Conversions in the United States," GeoJournal 69: 151-164.
- **Hill, Christopher V.** 2008: **South Asia: An Environmental History**. ABC-CLIO: Santa Barbara and Oxford.
- **Quinn, Laura** and Dalton, M. 2009: "Leading for Sustainability: Implementing the Tasks of Leadership," Corporate Governance 9(1).

## C. EXTRA-CURRICULAR

### Events and Outreach

The sustainability office, in collaboration with other departments and students clubs, has organized numerous events on campus that contribute to the overall level of knowledge regarding sustainability and climate change. Events include the 2008 Sustainability Summit, Earth Day each year, Campus Sustainability Day, RecycleMania, Bike Jam, Focus the Nation, Mt. Trashmore, and UCCS Climate Action Day. The sustainability office co-hosts a weekly sustainability radio program called "Green is the New Red, White and Blue" for the campus.

Additional educational outreach efforts feature inclusion of sustainability in freshman, faculty, and staff orientations, trainings for Resident Assistants, presentations for housing students, sustainability posters on bus shelters and kiosks, LCD displays at new LEED buildings describing the green building process and providing real time energy and water data, and incorporating sustainability features into campus tours.

### Student Leadership

#### Students for Environmental Awareness and Sustainability (SEAS)

Formed in 2003, this student club "work[s] toward creating a more conscientious campus community with regard to conservation of resources and creative, efficient ways of using them." In the spring of 2010, SEAS devoted its energy to establishing a campus organic, vegetable garden.

Net Impact

Established in 2009, this local chapter of an international student and professional organization works to engage business and MBA students in socially responsible careers and contribute to greater sustainability through ecologically sound business practices.

Colorado Public Interest Research Group (COPIRG)

The UCCS student chapter of COPIRG was founded in 2009 to “organize college students to solve some of the world's most pressing public interest problems.” Campaigns include Global Warming Solutions to promote and educate about energy conservation, energy efficiency, and renewable energy solutions to “show that students across the state support stopping global warming.”

Student Government Association (SGA)

SGA is the student governing body that developed and passed a referendum for a student fee to support solar photovoltaic installations on campus, supported a sustainability resolution ultimately passed by the Colorado University Board of Regents, and provided support and funding for the student garden.

Renewable Energy Club

Formed in 2010, its purpose is to educate and increase understanding of renewable energy, creating a forum for networking and research in renewable technologies and careers, and finding the most beneficial economic, social, and environmental renewable energy solutions and advance that knowledge. This club will lead student efforts to determine future solar energy projects on the campus.

**D. EDUCATION RECOMMENDATIONS**

- Incorporate sustainability into general education requirements for all students. Currently, there is a faculty committee that is exploring this idea,
- Develop faculty curriculum training in sustainability using the “Knapsack Institute” model that has been developed for training in inequality and social justice (<http://www.uccs.edu/~knapsack/>),
- Focus on sustainability at the Freshman Seminar retreat to encourage faculty and staff to incorporate sustainability themes into the various freshman seminars,
- Establish an “all campus reads” that is focused on sustainability -- this idea currently is being explored for the 2011-2012 academic year,
- Conduct a sustainability and climate literacy assessment and repeat every several years to track progress,
- Explore ways to further highlight UCCS as a demonstration campus for renewable energy – a living laboratory for sustainability – such as, solar thermal, thin film solar photovoltaics, traditional solar photovoltaics, geothermal, and wind turbine technology,
- Initiate an “Eco-Reps” program for student housing, and
- Offer a Sustainability Certificate program for professionals, perhaps partnering with the Catamount Institute or Pikes Peak Community College, and utilizing outside community and national instructors.

## 7 FUNDING MECHANISMS

This plan provides projects, strategies and recommendations that UCCS can pursue to move toward carbon neutrality and further meet campus sustainability goals. It is imperative that ongoing leadership and financial support for these initiatives is provided to ensure progress toward carbon neutrality. There are a number of potential strategies to fund these projects.

- Dedicated Rollover Budget: The number of energy and carbon projects identified in this initial assessment is numerous and will require funds to ensure completion. This strategy captures a portion of the savings generated through projects, as well as rebates, to further invest in future energy reduction projects.
- Capital Project Savings: With the completion of 4 new LEED buildings, there are significant savings on utility bills. UCCS should consider using some of these avoided expenses to invest in energy projects in existing buildings.
- Student Green Fees: In 2008 students passed a \$5 per semester fee to help fund solar energy on the campus. This fund will end in 2013. Either a renewal of this fund or an expansion to include energy reduction projects should be considered.
- Rebates from Colorado Springs Utilities: While rebates will not completely fund energy efficiency project, they should be pursued as much as possible to augment the necessary funds.
- Federal, State and Local Grants: The sustainability office is very active in pursuing rebates for projects as well as grant funding from the Governor's Energy Office. UCCS should continue to research and pursue larger efficiency projects. This has traditionally been difficult due to staffing levels and will remain so in the near term.
- Alumni and Philanthropic Giving: Sustainability and energy efficiency are becoming popular topics with many organizations and alumni. This is an area that could be developed to allow donors to target funds.
- Annual Capital Projects Process: A number of projects that are more significant in nature will be part of larger capital projects. It is important that the identified energy initiatives are integrated with the capital projects process.

## 8 IMPLEMENTATION STRUCTURE

Every five years the Climate Action Plan will be reviewed and revised to reflect changes in UCCS budgets, strategic plans, markets and technology. This review will allow us to consistently re-evaluate our progress in achieving milestones and our emissions reduction strategies as well as leveraging the latest technologies and market conditions. A full greenhouse gas inventory will be completed every two years, with a Scope 1 and 2 emissions assessment done each year.

This implementation identifies the need for an official Climate Action Committee (CAC) with reporting responsibility to the Leadership Team of the university. At the beginning of each academic year, this committee will review the list of recommended actions and select priority items for implementation in that year. A subcommittee, consisting of CAC members as well as key faculty, staff, and students essential to implementing the actions, will be established for each action to be implemented in that year. In addition to the overall emissions reductions and cost saving potential, actions should be evaluated on ease of implementation, relation to other campus activities (e.g., a building renovation would prioritize any actions associated with that building), and other criteria which may expedite the implementation of the project.



## APPENDIX A - COLORADO BOARD OF REGENTS SUSTAINABILITY RESOLUTION

**University of Colorado**

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**Michael Carrigan**  
**Regent**

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Denver, CO 80202  
Phone (303) 295-8314  
E-mail: Michael.Carrigan@cu.edu

**TO:** Board of Regents  
**FROM:** Regent Michael Carrigan  
**DATE:** November 11, 2009  
**SUBJECT:** CU Sustainability and Practices

**I. REQUEST FOR ACTION BY THE BOARD OF REGENTS**

I recommend that the following resolution be submitted for approval by the Board of Regents on November 12, 2009.

WHEREAS the University of Colorado Board of Regents encourages sustainability efforts on a university-wide basis;

WHEREAS the University of Colorado has been recognized as a national leader for its sustainability efforts; and

WHEREAS that the Board of Regents recognizes the leadership of all three chancellors on behalf of their respective campus in sustainability and encourages the university's commitment to the American College and University Presidents' Climate Commitment; and

WHEREAS the mission of the University of Colorado is to contribute to the progress of knowledge and innovation, as well as teaching and conducting research for the sake of improving our world; and

WHEREAS the University of Colorado has a long history of partnering with major government research institutions such as National Renewable Energy Laboratory, National Center for Atmospheric Research, and Cooperative Institute for Research to create solutions to global climate problems; and,

WHEREAS 650 major college and universities around the country have joined the American College and University Presidents' Climate Commitment.

NOW THEREFORE BE IT RESOLVED that the Board of Regents recognizes the significant potential financial and resource savings generated by campus investments in Leadership in Energy and Environmental Design (LEED) standards for buildings on campus and directs the president and chancellors to incorporate LEED standards in university buildings wherever possible;

## APPENDIX A - COLORADO BOARD OF REGENTS SUSTAINABILITY RESOLUTION

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CU Sustainability and Practices  
November 11, 2009  
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FURTHER RESOLVED that the Board of Regents directs the president to ensure that the campuses complete the development of their respective comprehensive plans to achieve climate neutrality as outlined in the American College and University Presidents' Climate Commitment by June 30, 2010.

FURTHER RESOLVED that the Board directs the president to work with the chancellors to incorporate into their comprehensive plans the Governor's Colorado Climate Action Plan and the Greening of State Government Executive Orders.

**FURTHER RESOLVED that the Board recognizes that certain sustainability requirements may present an economic challenge in light of declining state support or other reasons; if the administration concludes that compliance with this resolution presents undue burden on a particular project or operation or the administration has an alternative plan to reach the same goals in a more efficient manner, it may exempt it from this resolution as long as it reports the decision and basis for the exemption to the Board;**

FURTHER RESOLVED that the president and chancellors should report to the Board of Regents on the progress on a bi-annual basis.

## II. STATEMENT OF INFORMATION

At the September 16, 2009, Board of Regents Budget and Finance Committee meeting, each campus gave a presentation on its efforts to develop sustainability plans. The campus sustainability plans have been informed by two documents:

- American College and University Presidents Climate Commitment – signed by each campus chancellor in 2007.
- Colorado Climate Action Plan and the Greening of State Government Executive Order – This established 2012 goal for a reduction in energy by 20 percent based upon a FY 2006 baseline.

A presentation by the Intercampus Student Forum Chair, Dustin Farivar, called on the Board of Regents and President Benson to become one of the first statewide systems to formally support the American College and University Presidents' Climate Commitment (ACUPCC). ICSF Chair Farivar and other student leaders presented a resolution for the Board to take a rigorous step forward to co-create CU Sustainability Standards and Practices with students, campus sustainability officers, and members of the university administration.

## III. PREVIOUS ACTIONS

None

## APPENDIX B - UCCS PROPOSED ENERGY PROJECTS

Building	Measure Description	MMBtu Savings	kWh Savings	Total Cost Savings/year	Project Cost (before rebates)	Simple Payback (years)	Annual MtCO <sub>2</sub> e Reduced
Columbine Hall	Install occupancy and photocell sensors in hallways, bathrooms, window seating areas, and select classrooms.		104,821	\$6,813	\$10,300	1.5	81.0
Columbine Hall	Retrocommission major mechanical systems. Include performance of P2P and functional Performance Tests on major mechanical equipment.	372	123,046	\$8,031	\$32,260	4.0	114.8
Columbine Hall	Install dedicated cooling units for computer labs to separate from rest of building.	To be analyzed					
Main Hall	Install occupancy and photocell sensors in hallways and bathrooms.		28,271	\$1,838	\$6,800	3.7	21.9
Dwire Hall	Change out 60 metal halide lights in atrium.		9,971	\$648	\$12,000		7.7
Dwire Hall	Building has no vestibule and doors often do not fully close. Add revolving door to entryway.	10	2,732	\$178	\$42,000	235.4	2.6
Library	Retrocommission major mechanical systems. Include performance of P2P and functional Performance Tests on major mechanical equipment.	424	186,601	\$553	\$52,098	94.1	166.7
Library	Install motion sensors in appropriate areas including study rooms and bathrooms, some offices.		66,925	\$4,350			51.7
Library	Retrofit 110W HPS lamps ion recessed cans at west entryway with 18W fluorescent PL lamp.		6,716				5.2

## APPENDIX B - UCCS PROPOSED ENERGY PROJECTS

Building	Measure Description	MMBtu Savings	kWh Savings	Total Cost Savings	Project Cost (before rebates)	Simple Payback (years)	Annual MtCO <sub>2</sub> e Reduced
Parking Garage	Retrofit HID lights with LED lights.		115,433	\$7,503	Waiting on estimate		89.2
Cragmor Hall	Install occupancy and photocell sensors in hallways including bridge between Cragmor and Main.		9,322	\$606	\$3,000		7.2
University Hall	Tie lighting in hallways and classrooms to Setpoint BAC system. Motion and photocell sensors where appropriate.		97,780	\$6,356	\$25,000	3.9	75.6
University Hall	Replace 4 boilers with high efficiency units.	426		\$377			22.5
Engineering	Create server room with its own cooling system to turn off AHU's currently running 24/7.	308	72,939	\$5,013	\$50,000	10.0	72.7
Engineering	Building entryway has no vestibule. Add vestibule or revolving door to entryway.	To be analyzed					
Engineering	Complete renovation.	29	791,888	\$51,498			613.6
Campus wide	Install Energy Star Vending machines.		73,474	\$4,776	None with contract		56.8
Campus wide	Eliminate space heaters by addressing building heating issues. Where impossible ensure the use of 300W heaters.	To be analyzed					
Campus wide	Continue to de-lamp where appropriate according to foot candles and occupant comfort.		4,738	\$308			3.7
Campus wide	Replace 10 refrigerators with Energy STAR.		5,879	\$382	\$0	0.0	4.5
Campus Wide Parking Lots	Replace lights with LED lamps.		151,110	\$9,822	\$409,212	41.7	117.4