

Colorado  
College  
Carbon  
Neutrality  
Plan

2020

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As a signatory to the American College & University Presidents Climate Commitment, Colorado College is committed to creating a carbon neutral campus by 2020.

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## INTRODUCTION

The American College & University Presidents' Climate Commitment is a high-visibility effort to address global warming by garnering institutional commitments to neutralize greenhouse gas emissions, and to accelerate the research and educational efforts of higher education to equip society to re-stabilize the earth's climate. Colorado College President Richard Celeste signed the ACUPCC in April of 2009. Colorado College's goal for achieving carbon neutrality is 2020. The college's long-term goal is to become carbon-regenerative and a net energy producer.

Other energy-related goals include:

- Utilize existing and evolving data tools to manage and monitor buildings in a way that is economically responsible, promotes maximum efficiency, and guarantees individual comfort and health of all within the Colorado College community.
- Achieve a 20% reduction in energy use (electricity, heating, and transportation) through conservation and behavioral change measures.
- Achieve a 30% reduction in energy use (electricity, heating, and transportation) through efficiency upgrades.
- Invest in the technologies and practices that will arise with a new energy economy.
- Help provide energy security to the Colorado College campuses and stabilize energy costs.
- Support in excess of 100 percent of electrical energy needs from renewable energy sources, such as solar, wind, biomass and geothermal.

## EXECUTIVE SUMMARY

## BASELINE EMISSIONS INVENTORY

### METHODOLOGY

Colorado College conducted its first inventory of greenhouse gas emissions in 2008, which includes operations at the main campus in Colorado Springs, the Baca campus in Crestone, CO and the Stabler-Gilmore Cabin in Florissant, CO. The FY2008 inventory serves as the baseline for CC's Carbon Neutrality Plan (CCNP). Properties owned by the College but managed by external entities were excluded from the inventory because the College is not responsible for the occupancy or maintenance of utilities for the associated buildings.

Colorado College uses the Clean Air – Cool Planet (CA-CP) campus carbon calculator, version 6.6. The CACP tool is based on well-reviewed methodologies from the Intergovernmental Panel on Climate Change. The tool provides an accessible and well-documented platform for maintaining the greenhouse gas inventory. It is targeted specifically at colleges and universities, allowing for easy comparison with other institutions.

In most cases, Colorado College uses CA-CP default emissions coefficients. However, the electricity emissions coefficient is derived from the unique energy mix from Colorado Springs Utilities, our local provider.

The inventory is conducted using a list of global warming potentials from the Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report.

The inventory includes emissions from the following sources:

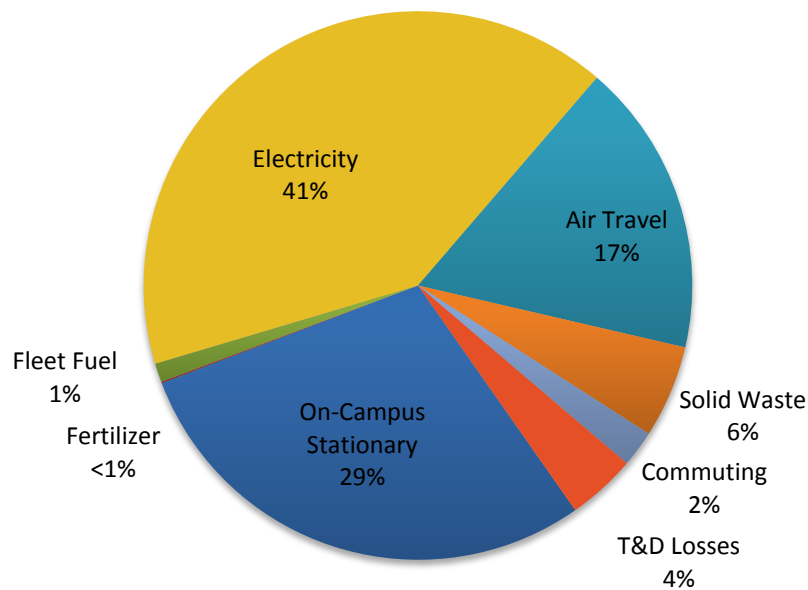
- Scope 1: Stationary Combustion (natural gas, propane, heating fuel), Mobile Combustion (fleet fuel), Fugitive Emissions (fertilizer)

- Scope 2: Purchased Electricity
- Scope 3: Air Travel, Solid Waste, Commuting, and Transmission & Distribution Losses

## RESULTS

The gross total greenhouse gas emissions in the 2008 baseline year amounted to 32,119 MTCO<sub>2</sub>e. The largest contributor to the College’s greenhouse gas emissions is purchased electricity, at 41%. An additional 4% is attributed to the transmission and distribution losses from the grid system. The second largest contributor is “on-campus stationary”, which accounts for heating, primarily from natural gas. In 2008, heating represented 29% of the College’s total emissions. In 2008, electricity and heating in buildings accounted for 23,688 MT CO<sub>2</sub>e, or 74% of the College’s total emissions.

### Greenhouse Gas Emissions by Source, FY2008



## TARGET REDUCTIONS

- 11,800 MTCO<sub>2</sub>e through combined building efficiency & conservation strategies
- 7100 MTCO<sub>2</sub>e through efficiency upgrades
- 4700 MTCO<sub>2</sub>e through conservation

## STRATEGIES

Colorado College Carbon Neutrality Strategy		
Baseline GHG Emissions (FY08)	32119	
Strategies	Estimated Reductions (MTCO <sub>2</sub> e)	% of Total
Efficiency in Existing Buildings	6700	21%
Conservation (Behavior Change)	4500	14%
Waste Minimization	1000	3%
Alternative Transportation	300	1%
Renewable Energy	19619	61%
<b>Total</b>	<b>32119</b>	<b>100%</b>

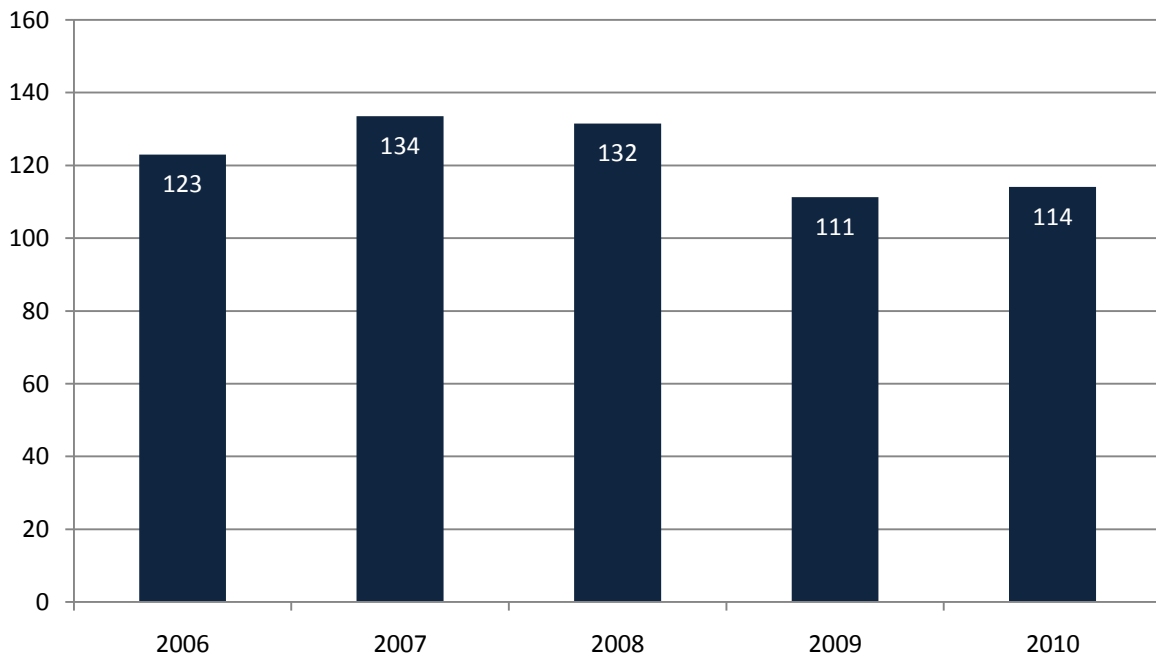
## EFFICIENCY IN EXISTING BUILDINGS & CONSERVATION

### Goals:

Colorado College will implement energy efficiency upgrades, energy management strategies and educational initiatives to achieve a 50% reduction in energy intensity per square foot by 2020. The target for energy efficiency is a 30% reduction in buildings campus-wide through technological upgrades. The target for conservation is a persistent 20% reduction in energy consumption through behavior change resulting from education.

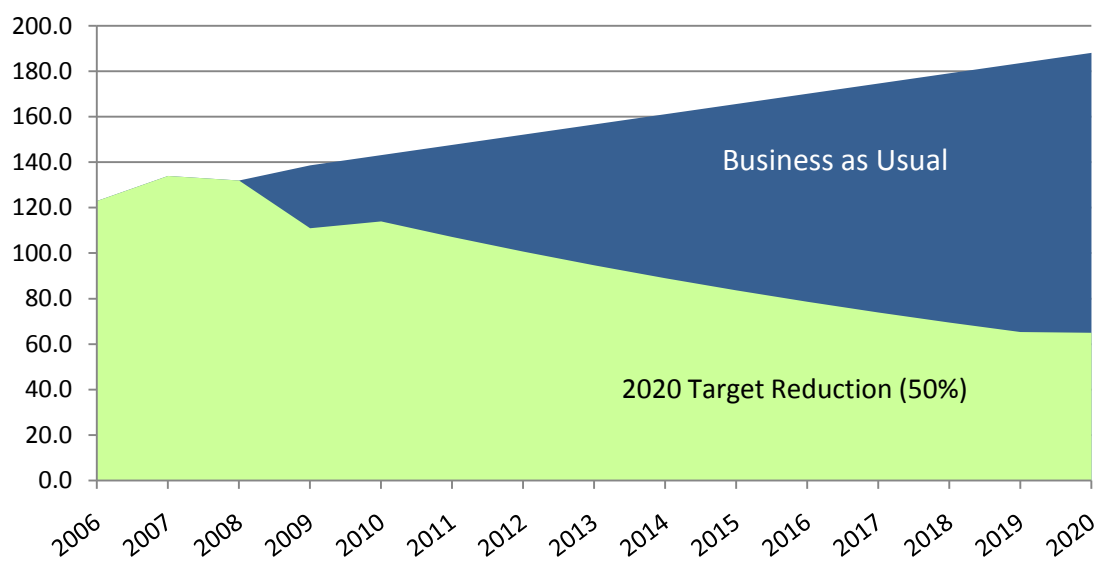
The *Efficiency in Existing Buildings* and *Conservation* strategies will target the energy intensity (kBtu/ft<sup>2</sup>) in all campus buildings. The energy intensity in 2008 was 132 kBtu/ft<sup>2</sup>. Prior to 2009, the College was exhibiting an annual increase in energy intensity of 2.6%.

### Colorado College Annual Energy Intensity kBtu/ft<sup>2</sup>



Our 2020 target is an overall 50% reduction. The College has already achieved significant reductions in energy intensity, even with the addition of the 72,000 square foot Edith Kinney Gaylord Cornerstone Arts Center. The 2010 energy intensity was 114 kBtu/ft<sup>2</sup>, a 13.6% reduction relative to the baseline. Moving forward, our goal is to continue to reduce energy intensity at an average rate of 6% per year until we reach 65 kBtu/ft<sup>2</sup> in 2019.

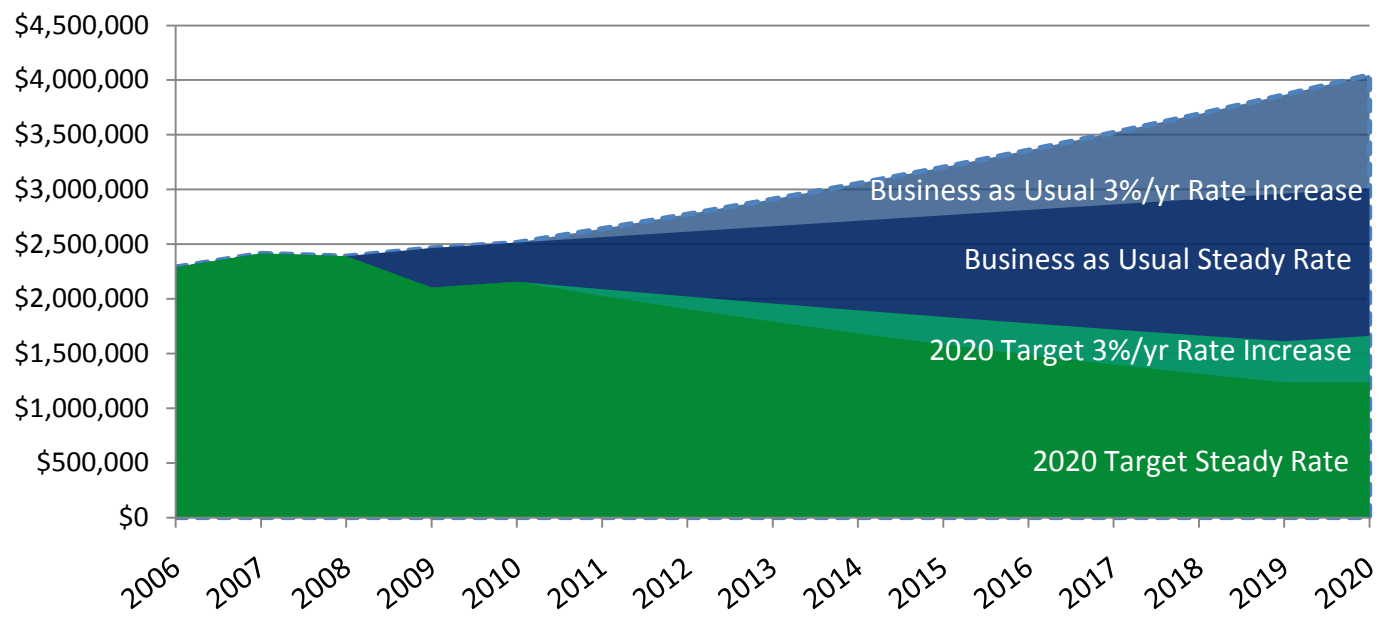
### Colorado College Main Campus Energy Intensity (kBtu/ft<sup>2</sup>)



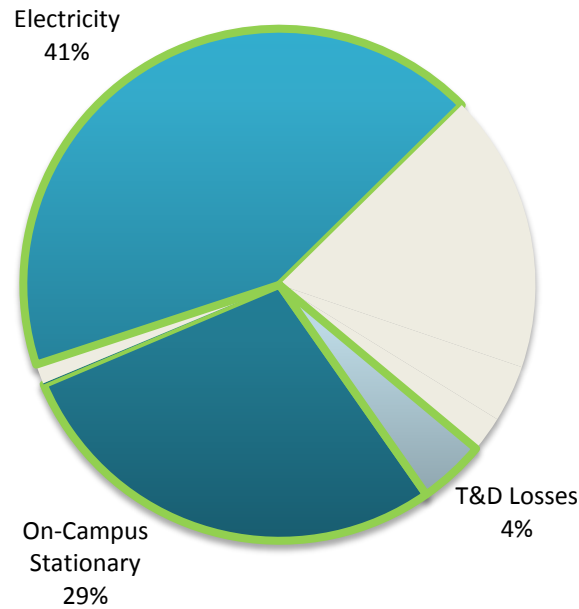
### Associated Cost Savings

Assuming utility rates remain steady at the 2010 average, the College can expect significant cost savings associated with efficiency and conservation measures. Including the existing savings from reductions achieved in 2009 & 2010, the estimated cumulative savings through 2020 are \$12.93 million. According to Colorado Springs Utilities, it is fair to assume an annual rate increase of 3% per year. In that case, estimated cumulative savings amount to \$15.55 million.

### Colorado College Annual Energy Cost



### Colorado College Building-Related GHG Emissions, FY2008



Goal: Colorado College will implement energy efficiency initiatives in buildings campus-wide to achieve a 30% reduction in energy intensity per square foot by 2020.

#### Major Academic Buildings

- Worner
- El Pomar
- Armstrong Hall
- Tutt Library
- Barnes
- Olin
- Packard
- Edith Kinney Gaylord Cornerstone Arts
- Tutt Science Center

#### Major Residence Halls

- Mathias
- Slocum
- Loomis
- Western Ridge Apartment Complex

#### Smaller Buildings

#### Energy Star Appliances

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## CONSERVATION & BEHAVIOR CHANGE

### Goal:

Colorado College will implement energy management and educational initiatives to achieve a consistent 20% reduction in energy consumption through behavior change.

### Education

- Peer-to-Peer Programs
  - ECO-Reps & Champions
- Energy Dashboards & Annual Competitions

### Conservation Tools

- Sticker Prompts
- Drying Racks & Dryer Balls
- Shower Timers
- Remote Control Power Strips
- Kill-a-Watt Metering
- Conservation Hardware
- Offset Calculator

In spring 2009, the Campus Sustainability Council and EnAct launched the aClimate 14 conservation campaign. The goal was to reduce energy use by 14% through behavior changes. The campaign utilized informative posters and weekly emails – one for each of the fourteen weeks in the semester – that offered tips on how to reduce individual resource use. It was hugely successful campaign; the campus exceeded their goal and reduced energy use by 20% (is that number right?), which translated to \$100,000 savings on utilities.

Education is an important tactic to create behavior change. Multiple classes at CC include an educational component about sustainability. Slides that contain conservation tips are peppered in the rotation of slides that appear on the Worner screens. Signage in Tutt Science informs passersby of the various ways in which the building conserves resources.

CC also offers sustainability tours. The CC sustainability website offers a virtual sustainability tour of the campus, with stops that include the CC garden, LEED gold certified Cornerstone Arts Center, Synergy house, solar panels on top of the Edith Kinney Gaylord apartments, and composting earth tubs. Sustainability interns and coreps are available to give walking sustainability tours of the campus as interest arises. In spring 2010, visiting elementary school children experienced sustainability tours, and starting in fall 2010, sustainability tours are offered to incoming first-years during new student orientation.

The sustainability plan at CC also takes advantage of online media to promote its efforts and educate the campus. The website offers a wide array of resources and provides extensive descriptions of the panoply of sustainability initiatives at the college. The energy section allows visitors to view the college's greenhouse gas emissions inventories from the past three years. The campus sustainability plan, which outlines CC's strategy for achieving carbon neutrality by 2020, is available through the website. A list of links to informative sites helps student learn more about sustainability generally. The site also lists ways in which members of the CC community can get involved in sustainability on campus, for example by joining any number of sustainability-minded student groups. The virtual sustainability tour allows anyone to learn about projects remotely. In February 2010, Claremont-McKenna rated CC's website number four for the best sustainability reporting among the top fifty liberal arts colleges in the nation. The sustainability program also utilizes Facebook to promote events and reach out to students.

The sustainable living program allows six or seven students per year to live in Synergy, a themed on-campus house that promotes sustainable habits and living. Residents of the house are environmentally conscious students who promote sustainability on campus by adhering to sustainable practices in their daily lives and fostering an environmentally conscious community.



Annual energy challenges and competitions encourage students to reduce personal resource use through education, awareness, and incentives. For example, the April Energy Challenge in 2010 utilized displays in Worner Campus Center that showed daily energy consumption changes in most residential buildings on campus. Awards were given to residents of the buildings that achieved the greatest reduction in energy consumption that month.

The sustainability program is looking to invest in building dashboards that give real-time data about energy consumption in the building. These highly visible tools promote conservation by serving as a regular reminder to reduce energy consumption and by educating residents about fluctuations in energy demand throughout the day and year.

There are many tools on campus students can utilize to facilitate conservation. Drying racks and dryer balls are available to check out; five-minute shower timers help students reduce shower time; kill-a-watt meters allow students to learn how much energy an appliance requires; remote control power strips provide a convenient way to unplug and reduce phantom load; Conservation Hardware, a local business, sells other tools to encourage conservation; the online offset calculator allows those interested to learn how much carbon dioxide their travel produces and offers them the option to offset those emissions by donating to the EcoFund. (Sticker prompts? What are those?)

The EcoFund provides grants to support conservation initiatives on campus. Anyone can submit a project idea to the EcoFund board. Past projects have included, the CC Farm, a water filter station, and drying racks in the dorms.

ECO-reps is a program that promotes conservation from a grassroots level. Representatives from all different living areas receive information about how to reduce resource consumption and disseminate this information to their living communities. Sustainability champions are the faculty and staff equivalent of ECO-Reps; they volunteer to promote sustainability in their working environment. ECO-Reps and sustainability champions act as the eyes and ears of sustainability in their living and working spaces and help promote campus-wide behavior changes.

New student orientation provides a great venue to promote sustainability at CC to incoming students. Activities include sustainability tours and informational tables staffed by interns to educate students on available resources and upcoming events. In the future, a page will be included in the new student handbook that will list items incoming students do not need to buy, as they are available to check out from the dorms, to further promote conservation.

CC has an extensive waste-minimization program. The college participates in Recyclemania, an annual competition among schools across the nation to increase recycling. At the end of the year, students are able to drop off unwanted items that are collected and donated to local charities. Trays have been removed from dining halls to reduce water and energy use associated with washing them and to discourage food waste. Single-use plastic bags are being phased out in Local Goods. Water bottle filter stations provide an alternative to bottled water, which is no longer sold on campus. Students are encouraged to bring their own mug to the coffee shops on campus. Composting is available in the main dining hall, and it is used to nourish the CC farm and the award-winning flowerbeds on campus. Handkerchiefs are periodically given out to students to discourage tissue use.

Earth Week is a veritable sustainability blitz. A week full of activities, workshops, concerts, and barbecues inform students how to live more sustainably, promote awareness, and get students excited about globally-minded living.

At least once a year, students are asked to make pledges to reduce their impact on the environment. These pledges help students consider their personal consumption, think about how to reduce it, and take action to do so.

Starting in spring 2010, CC students annually take an ecological literacy survey. This survey gauges how well students understand climate change and its associated causes and affects, as well as how aware they are of sustainability initiatives on campus. This survey data allows the Campus Sustainability Council to better understand the attitudes toward sustainability on campus, judge how affective their efforts are, and modify their approach to better suit the community.

The commuter trip reduction program is a comprehensive initiative to reduce greenhouse gas emissions associated with travelling to and from campus. This includes faculty and staff commuting, student travel to and from campus over holidays and breaks, and daily trips students make off campus. There are multiple tools available to do this. A car-sharing program gives students, faculty, and staff the opportunity to have access to a car and thereby reduce the incentive of owning a car. Car-sharing programs are effective ways to take cars off the road; as the program becomes more established, it will hopefully reduce the need for students to

bring a car to campus. The yellow bikes program allows students to borrow bikes on campus and reduce the need to drive. The bicycle co-op provides free tune-ups and other maintenance services to further encourage bicycle use. The carbon offset calculator provides a way for students, faculty, and staff to offset emissions associated with commuting. CC is looking to invest in a ridesharing program that facilitates carpooling in order to further reduce emissions.

The Office of Sustainability helps educate the campus on sustainability issues and initiatives with the blockly publication of the GreenWipe. This informative newsletter not only provides entertainment in the stall, it also gives tips, news, and provides general information about sustainability at CC.

The office of sustainability, composed of a sustainability coordinator and six student interns, is responsible for carrying out all of these programs and initiatives and for ensuring CC meets its goal of achieving carbon neutrality by 2020. As co-chair of the Campus Sustainability Council, the sustainability coordinator is the sustainability authority on campus. With the support of CSC and the interns, she oversees, leads, and participates in all things related to sustainability on campus. She also forms relationships with the Colorado Springs community and helps integrate the common goals of the city and the college. The student interns are the foot soldiers for these sustainability initiatives and further CC's lofty conservation goals by planning, coordinating, and supporting sustainability on campus.

aCClimate

Education

Sustainability Tours

Media: Facebook, Website

Sustainable Living

- Synergy

Overall longterm goal: 20% consistent reduction in electricity and heating through behavioral change

Annual Energy Challenges & Competitions

Building Dashboards

Conservation Tools

EcoFund

ECO-Reps

Sustainability Champions

New Student Orientation

Ecological Literacy Survey

Earth Week

Behavior Pledges

Greenwipe

Sustainability Office

- Coordinator
- Interns

## WASTE MINIMIZATION

Target Reduction: 500 MTCO<sub>2</sub>e

- Single Stream Recycling
- Recyclemania
- Move-Out Drive
- Trayless Dining
- Reusable To-Go
- Single Use Plastic Bag Phase-out
- Water Bottle Refill Stations
- Bring Your Own Mug
- Composting

## ALTERNATIVE TRANSPORTATION

Goal: 200 MTCO<sub>2</sub>e

- Alternative Vehicles
- Rideshare
- Bikeshare

## RENEWABLE ENERGY

The purpose of this section is to provide assessment of the College's renewable energy options. Renewable energy is an important part of the carbon neutrality plan. According to this plan, renewable energy sources account for 50% of emission reductions. This goal requires the use of *X amount* of renewable energy sources. This *amount* can be produced on and off campus using solar energy, wind energy or some mix of both. What follows is an analysis of 4 different scenarios. Each includes a discussion of financing options, strategies, and the benefits/drawbacks of each scenario.

Energy Target = 10MW

### **Scenario 1: Off-campus Solar**

Strategy – Use a large off-campus solar installation to provide energy for the college. A 10MW installation will require approximately 50 acres of land.

#### Pros

- Possibility of reclaiming a large plot of cheap unused land.
- A large installation will be more efficient than smaller ones.

#### Cons

- Liability of reclaiming Brownfield sites

## Financing

Costs: under review

Payback: under review

Source: under review

## **Scenario 2: Off-campus Wind**

Strategy – Use a large off-campus wind installation to provide energy for the college. A 10MW installation will require the purchase and maintenance of several wind turbines.

### Pros

- Better option for our local region (more cost effective than large solar installation)
- GE has already proposed a 45 MW installation

### Cons

- Will the city allow wind power on the grid?
- Bird Issue
- Uncertain future of wind in Colorado

## Financing

Costs: under review

Payback: under review

Source: under review

## **Scenario 3: Mix of Off-campus Solar and Wind**

Strategy – Use some portfolio of strategies 1& 2 that meets the 10MW requirement.

### Pros

- Find a cost-effective balance
- Diversification of renewable assets

### Cons

- College is distanced from its renewables (minimal visibility or ownership)

## Financing

Costs: under review

Payback: under review

Source: under review

#### **Scenario 4: Mix of On-campus and Off-campus Solar and Wind**

Strategy – Utilize roof space and parking lot space on the CC campus for solar installations (this has the potential for up to 1MW). The remaining energy requirements will be met by the mix of wind and solar options discussed in scenario 3.

#### Pros

- On campus visibility
- Edith Gaylord installation as a model
- Student Involvement

#### Cons

- Higher Costs?
- Aesthetics

#### Financing

Costs: under review

Payback: under review

Source: under review