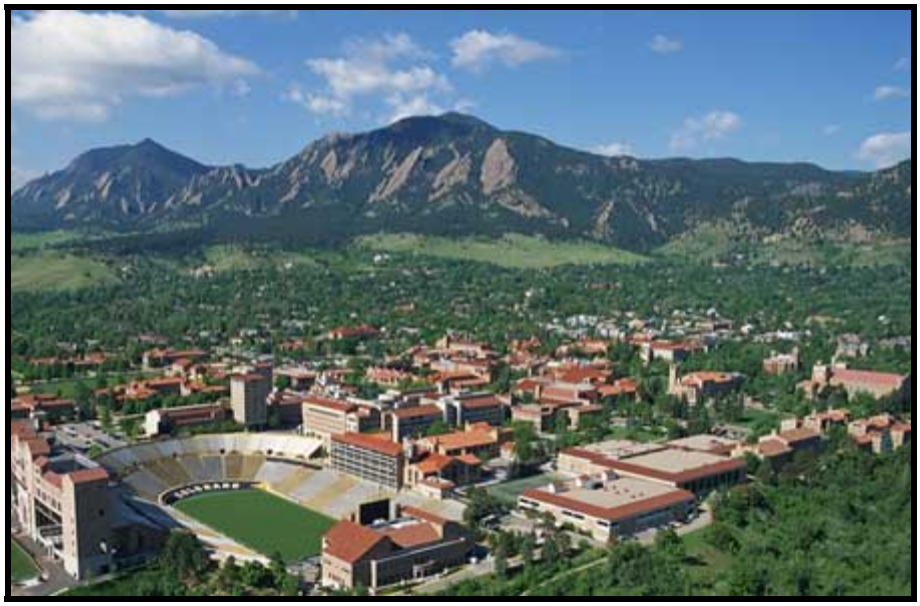
University of Colorado at Boulder

Campus Sustainability Plan in Support of the Greening of State Government Executive Order



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Summary of Government Executive Order

Energy Management

- By fiscal year 2011-2012, achieve at least a 20% reduction in energy consumption of state facilities below fiscal year 2005-2006 levels;

- By January of 2008 develop or update an energy management plan and ensure development of a study determining feasibility of energy performance contracting for all state owned facilities;

- On an ongoing basis, assess and implement where effective, the development of state renewable energy projects with the support of the Governor's Energy Office.

Materials and Resource Management

- By fiscal year 2008-2009, develop purchasing policies to reduce the state's environmental impact as a consumer of products and services;

- Adopt a goal of "zero waste" from construction of new buildings and operation and renovation of existing facilities;

- Achieve a paper use reduction goal of 20% by fiscal year 2011-2012 using fiscal year 2005-2006 as a baseline;

- Achieve a reduction of water consumption goal of 10% by fiscal year 2011-2012, using fiscal year 2005-2006 as a baseline;

- The Department of Personnel, in cooperation with the Department of Public Health and Environment, shall develop purchasing policies for selecting environmentally preferable products.

Vehicle Petroleum Consumption and Fleet Efficiency

- By June 30, 2012, achieve a 25% volumetric reduction in petroleum consumption by state vehicles measured against a fiscal year 2005-2006 baseline, while increasing energy efficiency of the fleet (excluding vehicles used for law enforcement, emergency response, road maintenance, and highway construction).

- By December 1, 2007, complete a transportation efficiency audit addressing methods for improving the environmental efficiency of the state fleet.

Background

CU-Boulder has a long and successful history of sustainability initiatives and leadership. Students on the campus were the first to establish a campus recycling program (1976), a bus pass program (1991), and purchase renewable wind power (2000). Many entities have been at the forefront in greening the institution and this has become more established and common practice in recent years.

In 2002, with the establishment and staffing of the Office of Energy Conservation, the Boulder Campus began a more consolidated energy and resource conservation campaign to educate the campus community on energy conservation, water conservation and waste reduction. This on-going campaign includes a hotline and website for reporting energy waste, conservation tips, and information on energy usage and the cost of utilities for campus buildings and the associated environmental impact. The establishment of the Office of Energy Conservation compliments existing initiatives underway within Housing and Dining Services, the University of Colorado Student Union's (UCSU's) Environmental Center, and other academic and administrative departments.

In 2004, the student population was instrumental in the promotion and success of a campus pledge card campaign. They distributed materials, held informational booths on campus and asked the students and campus community to reduce their energy consumption. By signing the pledge cards, they committed to reducing their consumption by 10%. We received over 13,000 pledge cards. Also in 2004, we began the Buff Energy Star program which recognizes outstanding building proctors who reduce energy use in their buildings by at least 5 percent per square foot.

The University's recycling program is managed as a partnership between Facilities Management, Housing and Dining Services, and student government. This partnership has been implementing recommendations from a 2005 study that indicted significant potential for improving waste reduction, recycling, composting, and associated educational programs. The University currently recycles or composts approximately 35 percent of its waste.

The reduction in potable water usage from 412 million gallons to 286 million gallons was achieved by increased awareness due to the resource conservation campaign and the hotline to report water waste, the conversion of campus irrigation to ditch water, the water cooling conversion of the Power House (annual net savings of 20 million gallons) and research labs (annual net savings of 25 million gallons) to chilled water for equipment cooling, updating the Chemistry labs from water aspirators to small electric vacuum pumps (annual net savings of 10 million gallons), and the conversion of the campus restrooms to low flow water fixtures.

The reduction of steam, chilled water and electrical energy usage is the result of re-commissioning all campus building's HVAC systems and boilers, weather stripping older building windows, addition of insulation to campus steam and chilled water distribution networks, new high pressure steam traps, campus lighting upgrades and lighting occupancy sensors in large labs and conference rooms, the update of the Building Automation System (BAS) software for temperature set back after hours, weekends, and

holidays, desk top computer power management/sleep mode, and vending machine power management. Campus design standards require LEED Silver certification or equivalent for all new building and major renovation construction.

Past Energy Conservation Efforts:

	2001-2002 (FY02)			
	Total Consumption		**Per ft^2 Consumption**	
Electricity	121,719,160	kWh	14.5656	kWh
Chilled Water	4,080,726	Ton-hours	2.9772	Ton-hours
Steam	494,964	Klbs.	75.1925	lbs.
Water	412,479	Kgals	61.6899	gals

	2006-2007				
	Total Consumption		**Per ft^2 Consumption**		**Per ft^2 Reduction from FY02**
Electricity	125,655,068	kWh	13.0247	kWh	-10.58%
Chilled Water	4,295,814	Ton-hours	2.8620	Ton-hours	-3.87%
Steam	461,504	Klbs.	65.4072	lbs.	-13.01%
Water	286,277	Kgals	30.6346	gals	-50.34%

Energy Conservation Data based on guidelines in Executive Order:

Baseline (FY:2005-2006)

	Total Consumption		**Per ft^2 Consumption**	
Electricity	118,087,299	kWh	13.11	kWh
Chilled Water	4,422,758	Ton-hours	3.31	Ton-hours
Steam	436,045	Klbs.	68.35	lbs.
Gas[1]	1,013,153	Therms	0.30	Therms
Water	313,695	Kgals	35.81	gals

Reduction Goals (FY:2011-2012)

	Total Consumption		**Per ft^2 Consumption**	
	Goal (20% of Baseline)		**Goal (20% of Baseline)**	
Electricity	94,469,839	kWh	10.49	kWh
Chilled Water	3,538,206	Ton-hours	2.65	Ton-hours
Steam	348,836	Klbs.	54.68	lbs.
Gas[1]	810,522	Therms	0.24	Therms
	Goal (10% of Baseline)		**Goal (10% of Baseline)**	
Water	282,326	Kgals	32.23	gals

Footnote:

1. Gas consumption used in support of kitchen, laboratory, water heating and/or space heating needs at approximately 60 campus buildings.

The departments listed below and other campus communities are involved in numerous conservation and sustainability initiatives that are detailed in the following sections. The individual initiatives will be evaluated at a later time for their direct impact in support of this executive order. Other initiatives will be added if necessary in order to meet the goals.

AD – Athletic Department
E-Center – Environmental Center
ECO – Energy Conservation Office
EI – Energy Initiative
FM – Facilities Management
DC – Distribution Center including Materiel Management and Mailing Services
HDS – Housing and Dining Services
HMO – Housing Maintenance Operations
OB – Office of the Bursar
OR – Office of the Registrar
PBS – Payroll and Benefits Services
PD&C – Planning Design and Construction
PTS – Parking and Transportation Services
UCSU – University of Colorado Student Union
IT- Campus Information Technology

Energy Management

I. Common Energy Conservation Strategies

- Buff Energy Star (BES) program; promotes healthy competition among all campus buildings and building proctors to save energy and reduce waste. The minimum requirements are:
  a. To achieve 5% or more energy reduction during the past 12 months compared to the previous 12 months.
  b. Participate in a building energy audit and take action in support of audit findings and recommendations.
  c. To be the energy conservation champion and make conservation materials, stickers and posters available and visible throughout the building. We will continue to support this very successful program and expand current focus on research labs. (ECO)

- Continue to install new utility sub-meters to better identify energy conservation opportunities.

- Building mechanical systems recommissioning, expansion of Building Automation System (BAS) to control more critical HVAC points and therefore being able to set back temperatures after hours and holidays to reduce energy usage as well as proactive alarming for preventive maintenance and trouble shooting is a key strategy for building and HVAC energy management. The campus wide number of BAS control points has increased from 10,000-12,000 in FY05-06 to approximately 55,000 points.

- Given the successful and near completion of all campus building HVAC recommissioning, we are working on a pilot project to "mine" data from our Building Automation Systems (BAS), compare trends, signature and highlight potential HVAC performance problems and more energy conservation opportunities. (3-5% estimated energy savings) (ECO/FM)

- Additional design efforts to examine and evaluate all economically feasible energy efficiency options and technologies in design and construction of the new Heating & Cooling Plant will be implemented. Xcel Energy Demand Side Management (DSM) funding and rebates will supplement our economical justification for these energy efficiency measures. (ECO/PD&C)

II. Electricity

- *Current and Future Status of Consumption Reduction*

Current Reduction from Baseline

	Total Consumption	Per ft^2 Consumption
2005-2006 (Baseline)	118,087,299 kWh	13.11 kWh
2006-2007	125,655,068 kWh	13.02 kWh
% Change		-0.65%

Future Reduction Needed from FY:2006-2007

	Total Consumption	Per ft^2 Consumption
2005-2006 (Baseline)	118,087,299 kWh	13.11 kWh
Reduction Goal (20%)	94,469,839 kWh	10.49 kWh
% From Goal		19.48%

- *Conservation Projects*

Completed/In-Progress:

- Occupancy sensors installed in large classrooms/lab spaces. (ECO/FM)

- Upgrade the balance of campus buildings from T-12 to T-8 lamps and electronic ballast lighting systems. (ECO/FM)

- Ice/snow melt control system altered to more precisely monitor and correlate operation to outdoor conditions. (ECO/FM)

- Building Automation System has been expanded to cover Housing and Dining Services. Currently over 300 points monitored – freezers and coolers, outside air, domestic hot water, building temperatures, fans, pumps, makeup air temperature, and valves. Additional points being considered. (HDS)

- New UV hood system installed at Sewall residence hall. Cleaner ducts allow the fans to run at lower speeds, resulting in electricity savings. (HDS)

- Introduced Rational Combi ovens to Dining Units: increased efficiency and energy savings due to reduced cooking time. (HDS)

- In July, 2006, Vending Operations (in conjunction with Pepsi, Property Services and the Office of Energy Conservation) recommissioned campus vending machine compressors to run only during business hours and upgraded display lights to the most energy efficient styles. (DC, ECO)

Future Projects:

- Mailing Services will eliminate the bulk mail operation effective April 1, 2008. This should significantly reduce electricity consumption in the Mailing Services operation. (DC)

- Mass relamping of all exterior pole lights. Explore options to replace all exterior incandescent lamps with higher efficiency lamps and fixtures. (FM, HMO)

- Ensure all exterior lights are controlled by photo sensors. (FM, HMO)

- Identify campus compressed air leaks. (FM)

III. Steam

- *Current and Future Status of Consumption Reduction*

Current Reduction from Baseline

	Total Consumption	Per ft^2 Consumption
2005-2006 (Baseline)	436,045 Klbs.	68.35 lbs.
2006-2007	461,504 Klbs.	65.41 lbs.
% Change		-4.31%

Future Reduction Needed from FY:2006-2007

	Total Consumption	Per ft^2 Consumption
2005-2006 (Baseline)	436,045 Klbs.	68.35 lbs.
Reduction Goal (20%)	348,836 Klbs.	54.68 lbs.
% From Goal		16.40%

- *Conservation Projects*

Completed/In-Progress:

- Re-commissioned all campus HVAC system to optimize performance.

- Replaced all high pressure steam traps with new technology traps that include failure indicators and continue to inspect quarterly. (ECO/FM, HMO)

- Installed smart master steam valves to regulate steam flow to several buildings based on outdoor temperature. (ECO/FM, HMO)

- All campus boilers re-commissioned to optimize performance and continue to perform annual inspections and calibrations. (ECO/FM)

- Expanded the number of heating zones 3-8 times in the residence halls for improved comfort and energy efficiency. Over 2,000 steam traps replaced, and 500 new thermostatic valves have been installed on radiators. (HDS)

- Instituted a program for family housing turnovers to caulk and seal all units as well as provide energy conservation tips to new occupants. (HDS)

Future Projects:

- Develop program to inspect door and window weather stripping throughout campus buildings. (ECO/FM)

- Extend placement of water-mizers on autoclaves throughout campus research labs once pilot stage is complete.

- Review evening energy consumption to determine if there is any excess energy use during unoccupied hours. (FM, HMO)

- No un-insulated steam delivery pipes on campus. (ECO/FM)

IV. Chilled Water

- *Current and Future Status of Consumption Reduction*

Current Reduction from Baseline

	Total Consumption	Per ft^2 Consumption
2005-2006 (Baseline)	4,422,758 Ton-hours	3.31 Ton-hours
2006-2007	4,295,814 Ton-hours	2.86 Ton-hours
% Change		-13.55%

Future Reduction Needed from FY:2006-2007

	Total Consumption	Per ft^2 Consumption
2005-2006 (Baseline)	4,422,758 Ton-hours	3.31 Ton-hours
Reduction Goal (20%)	3,538,206 Ton-hours	2.65 Ton-hours
% From Goal		7.46%

- *Conservation Projects*

Completed/In-Progress:

- Re-commissioned all campus HVAC system to optimize performance.

- Insulated a number of chilled water delivery lines on campus.

Future Projects:

- Develop program to inspect door and window weather stripping throughout campus.

- Review evening energy consumption to determine if there is any excess energy us during unoccupied hours. (FM, HMO)

- Pursue funding to connect additional existing distributed cooling loads to the new campus central cooling loop. (FM, HMO)

- No un-insulated chilled water delivery lines on campus. (ECO/FM)

Materials and Resources Management

I. Green Purchasing

- *Current and Future Status of Consumption Reduction*

- *Initiatives*

  Environmentally Preferable Purchasing (EPP) Guidelines

  Through the use of these guidelines the University gives preference to environmentally friendly products whose quality, function, and cost are equal or superior to more traditional products. Considerations such as raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and disposal of the product are all considered when selecting a product.

  - Energy Star purchasing policy; in support of recently enacted campus policy of purchasing Energy Star appliances, the campus energy conservation office will be announcing support for the above policy by considering budgetary support for validated monetary premiums for Energy Star purchases. (ECO)

  - Green Seal certified foaming hand soap and jumbo toilet paper containing not less than 80% post-consumer paper content. (DC, FM, HDS)

  - Add a resource conservation section to Ralphie's Guide to Student Life which will include recommendations to buy green products and Energy Star devices. (HDS, ECO)

  - Housing and Dining Services to optimize purchasing system to prioritize the purchase of the most energy efficient products possible.

  - Facilities Operations and Housing and Dining Services specify the use of low-VOC paints and carpet with recycled content. (FM, HMO)

  - Vendor change to Ecolab in order to provide more environmentally friendly packaging for dining operations. (HDS)

  - Continue with the Environmentally Friendly Turf Management plan to reduce the use of pesticides and herbicides. (FM, HMO)

  - Continue with the efforts in Integrated Pest Management to minimize the use of chemicals and pesticides. (FM)

II. LEED Certification of New & Renovated Buildings

In 2005, based on the student capital construction fee and mandate, campus leadership decided to use Leadership in Energy and Environmental Design (LEED) as green and sustainable design and construction standards for student funded buildings. Campus Design and Construction standards were upgraded to meet LEED Silver rating or better and LEED certification became our focus for design and construction of new capital construction projects. Since then, we have achieved LEED Gold rating for our new Wolf Law, ATLAS buildings and the Koelbel School of Business addition and renovation. We are now working on sustainable design and LEED certification for the future Visual Arts Complex as well as the renovation of Arnett Hall. UMC renovation was also certified as LEED Silver in early 2006. LEED certification achievement is very important to our campus sustainability goal as well as reaching Greening of the State Government goals. Designing and constructing a building to LEED Gold level signifies 20-30% higher energy and water efficiency in comparison to a building that meets current building codes and common design and construction standards. LEED certified construction projects divert very significant portions of construction waste from landfills. This is an important step toward the "Zero Waste" construction goal. The LEED process also encourages and rewards the use of high recycled content materials during construction. UCB standards are also under ongoing review and call for high efficiency of motor, pumps, etc. to meet Xcel rebate requirements.

According to our most recent campus capital improvement plan, our campus will see one of the most significant levels of new construction as well as building renovation during the next 5 years. Our commitment to LEED certification(Gold) and application of Labs 21 for research buildings will make our expansion much more sustainable and create new buildings that are 20-30% more energy and water efficient than average code compliant buildings with far less construction waste and higher recycle content. (ECO/PD&C)

III. Paper Usage

- *Current and Future Status of Consumption Reduction*

Current Reduction from Baseline

	Cases of Paper [1]
2005-2006 (Baseline)	N/A
2006-2007	12,250
% Change	N/A

Future Reduction Needed from FY:2006-2007

	Cases of Paper [1]
2006-2007 (Baseline)	12,250
Reduction Goal (20%)	9,800
% From Goal	20%

Footnotes:

1. Each case of paper contains 5,000 sheets of paper.
2. Future plans include the need to identify additional sources of paper used throughout campus.
3. The paper supplied contains either 30% or 100% recycled content.

- *Conservation Projects*

In-Progress/Completed:

- Mailing Services recycles all undeliverable standard class bulk mail. Mailing Services also pioneered paperless-mail at CU by developing and implementing the campus E-memo and Buff Bulletin systems. Mailing Services hopes to remain in the forefront of the campus move to paperless communications. (DC)

- Waste reduction practices promoted to CU office users include double-sided copying as well as the use of interdepartmental mailing envelopes, advanced voice mail, e-memos, and Imaging Services print-on-demand capabilities.

- CU Environmental Center and Facilities Management monitor excessive amounts of print overruns that enter the IPF for recycling. Departments are provided with information about waste reduction options on campus.

- Materiel Management has recently implemented a new software system that will reduce the amount of paper used for purchasing/material requests, on both the ordering and billing ends of the process. (DC)

- The campus has initiated a very successful pay-for-printing at public computing labs.

- Distribution Center recently converted to electronic time-off requesting and approval. (DC)

- Property Services recently automated the billing process for their Moving and Hauling function. (DC)

- The Office of the Bursar has begun a transition to paperless billing of student tuition that will be fully in place by summer session, 2008. Electronic billing and payment acceptance will reduce paper consumption by at least 400,000 pieces per year (80+ cases). (OB)

- The Office of the Registrar accomplished paperless course registration for almost all students (special exception categories exist) in 1992, when a telephone process replaced paper. In 1998, on-line registration replaced the telephone process. In 2003, electronic student address change was implemented, reducing annual paper consumption by at least 500,000 pieces (100 cases). In the fall of 2007, additional paperless innovations were implemented (selective service and class drop forms) resulting in further reductions of approximately 13,200 pieces per year. (OR)

- Payroll and Benefits Services (PBS) converted to electronic distribution of employee pay advices in April, 2008. This will reduce paper consumption by approximately 485,000 pieces per year (97 cases). PBS is also reducing the amount of paper used in the employee benefit enrollment process in the spring of 2008 that will further reduce paper consumption as it is phased in over several years. (PBS)

Future Projects:

- Mandate double sided printing and coping. (ECO, FM, HMO)

- Work with Facilities Management Business Services to convert various forms to electronic format with electronic approvals; example: key request forms, travel authorization forms, Official Function forms, BCA's, leave requests, etc. (ECO,FM, HMO)

- Property Services is in the process of converting to electronic processing of surplus property disposal, from the initial request form through the final distribution of revenue and/or billing. (DC)

- Telecommunications plans to reduce telephone directories delivered to campus by approximately 25 percent (an estimated 25 tons of paper reduced). In addition, Web services such as the Personal Look Up System (PLUS) for registration and grades reduce the need for paper-based transactions.

IV. Potable Water

- *Current and Future Status of Consumption Reduction*

Current Reduction from Baseline

	Total Consumption	Per ft^2 Consumption
2005-2006 (Baseline)	313,695 Kgals	35.81 gals
2006-2007	286,277 Kgals	30.63 gals
% Change		-14.45%

Future Reduction Needed from FY:2006-2007

	Total Consumption	Per ft^2 Consumption
2005-2006 (Baseline)	313,695 Kgals	35.81 gals
Reduction Goal (10%)	282,326 Kgals	32.23 gals
% From Goal		-5.20%

Since we have already met our obligation to a 10% reduction, we will continue to reduce our water usage by 2% yearly.

- *Conservation Projects*

Completed/In-Progress:

- Water free urinals installed in 4 buildings on campus.

- Replaced water-driven aspirators with lab vacuum pumps in some Chemistry labs. (10 million gallons of water/year)

- Closed-loop piping to cool laser generators installed in the Joint Institute for Laboratory Astrophysics building. (25 million gallons of water/year)

- Approximately 3,600 faucets, 2,000 showers, and 2,000 toilets retrofitted with low-flow kits, in addition, to irrigation improvements. (HDS) Similar water conservation measures have been implemented in campus restrooms. (FM)

- Continue turf reduction and migration to xeric plantings throughout campus landscapes. (HDS)

- Continue to replace old tank water heaters with new instantaneous water heaters and reduce the water temperature to less than 120 ^{o}F. (FM, HMO)

Future Projects:

- Extend placement of water-mizers on autoclaves throughout campus research labs once pilot stage is complete.

- Improve the lawn sprinkler inspection program and develop a "report a broken sprinkler head" program. (FM, HMO)

- Utilize 1/8 gallon flush units when installing new urinals. (FM, HMO)

- Minimize boiler blow down from both the Co-Gen and Central Powerhouse. (FM, HMO)

- Look for additional water conservation opportunities in research labs. (EC/FM)

V. Recycling

- *Status of Recycling Efforts*

  The University currently diverts 1,980 tons or approximately 35% of materials from area landfills annually. The amount of material landfilled has trended downward for the past two years, with a slight increase in 2006-07.

Current Increase from Baseline

	Total Tonnage
2005-2006 (Baseline)	3,605
2006-2007	3,648
% Change	1.19%

- *Conservation Projects*

Completed/In-Progress:

- 8,665 cases of 100% recycled content copy paper provided to various departments. (DC)

- Recycle and sale of surplus pallets by Materiel Management in collaboration with the University's recycling center results in increased University Fiscal reimbursement, and reduction in "chipping" and disposal costs. (DC)

- Property Services receives thousands of surplus items each year from campus departments which no longer have a need for them, including electronics, furniture, office equipment and various educational, athletic and laboratory items. In an average year, Property Services facilitates the return of over 3,100 items to useful life in a new place on campus. (DC)

- Property Services processes over 230,000 pounds (per year) of surplus electronics and metals considered to be "trash". 99% of this is recycled rather than sent to landfills. (DC)

- Property Services facilitates the donation of hundreds of computers, computer related equipment, shoes and furniture to non-profit organizations and schools. (DC)

- In 2007, Property Services initiated the use of "ExpandOS", as a substitute for Styrofoam packing peanuts. The new product is

as lightweight as packing peanuts and about the same price, but is made of recycled paper and can be recycled again after use. (DC)

- Implemented single-stream recycling at Bear Creek apartments. (HDS)

- The Athletic Department working has identified some products within concessions that can be recycled. (AD)

- Implemented complete recycling effort around Football games. (AD)

- Starting Coors Event Center Recycling program around all events. (AD)

- Take scrap wood from shops and work areas to the composting area grinder for mulch or compost. (FM, HMO)

- Continue with Zero Waste Facilities Management appreciation events. Extend these events to retirement receptions and other recognition as well as Athletics events. (AD, FM, HMO)

- Reviewing feasibility of recovery and recycling tossed items from student residence hall move-out. (FM)

Future Projects:

- Investigate recycling options for maintenance and grounds waste. (HDS)

- Set up recycling stations in shops and work areas that will be taken to the Central Recycling station on a weekly basis. (FM, HMO)

- To expand football stadium recycling into the parking lots. (AD)

- Student government (UCSU) will work with Housing and Dining Services, UMC Food Service and New Employee Orientation to increase the use of reusable cups. A similar program, previously recognized by the EPA, has already reduced disposable cup usage by up to 30% in the University Memorial Center. (E-Center)

- In 2009, UCSU will suggest prohibiting the use of deep-dyed, neon paper campus-wide through Imaging Services and the Distribution Center because of its contamination of paper recycling.

- The Spring Semester Move-Out which collects reusable books, clothing, and appliances for local charities will be improved by

more student group participation and contract(s) with community service agencies like Habitat for Humanity. (E-Center)

- In 2008, a Capital Improvement Feasibility Plan will be completed that identifies long-term capital needs for the Intermediate Processing Facility which includes increased space for recycling and solid waste management operations to allow new materials to be collected, better space for class tours and training, and vital support for Facilities Management's collection operation. (E-Center)

- CU has begun assessing the costs and benefits of converting to a single stream recycling operation for at least a portion of the campus. A demonstration project will be conducted in the fall of 2008 with funds from the Boulder County Resource Conservation Division. (E-Center)

- Investigate the use of carpets that can be reclaimed by manufactures at the end of useful life.

VI. Sustainable Dining Services

- *Status of Composting Efforts*

Current Increase from Baseline

Dining Facilities Composting		
FY06(Baseline)	**FY07**	**YTD-FY08**
110.18 Tons	116 Tons	101.68 Tons

- Capacity is continually being increased in an effort to maximize composting throughout campus dining facilities. (HDS)

- *Conservation Projects*

Completed/In-Progress:

- "Let's Get Down to Earth" – presented by Environmental Center Staff to all dining staff on green cleaners, recycling, composting, organic and natural foods.

- Increase number of events and conferences that are zero waste such as Global Jam – a large event welcoming students to campus.

- As of January, Piazanos has served 61,623 100% Natural & Organic When Available Grab n Go meals since opening in mid January 2006.

- Vendor change to EcoLab – more environmentally friendly packaging and access to more Green Seal or equivalent products.

- Currently collecting pre and post consumer compost at Libby, Alley @ Farrand; preconsumer compost collected at Darley, Kittredge, Sewell, and Piazanos Grab n Go.

Future Projects:

- Based on research, cost analysis and availability of recommend sustainable alternative food items to be incorporate into all dining operations.

- Create sustainable culture by creating semi permanent displays in dining rooms of what Housing and Dining Services are currently doing and what customers can do.

- Grab n Go containers examined for possible change to maximum compostable and/or recyclable items available.

Vehicle Petroleum Consumption and Fleet Efficiency

I. Campus Fleet Efficiency and Petroleum Consumption

- *Status of Consumption Reduction*

Projected Reduction (25% by FY: 2012)

FY06(Baseline)	FY08	FY09	FY10	FY11	FY12
103,043 Gallons	102,013	95,830	89,647	83,465	77,282

- *Conservation Projects*

Completed/In-Progress:

- Purchased one hybrid for enforcement program. Currently evaluating remainder of parking fleet. (PTS)

- Limit idling of campus cars/fleet by policy and signage. (ECO, FM, PTS)

- PTS promote use of mass transit for on and off campus business travel through the Faculty/Staff Eco Pass program. Using mass transit instead of a single occupancy state vehicle reduces GHG emissions by 40% to 80% for related travel.

- CU Buff Bike program has 30 bicycles available for check out by students, faculty and staff. Faculty and staff often use the bikes for campus business.

- Will continue to expand use of Biofuel in campus buses.

- In 2003, Mailing Services reduced campus mail delivery from twice per day to once per day, reducing fuel consumption by 50%. (DC)

- Effective November, 2007, Materiel Management has reorganized to deploy two 2+ ton vehicles on daily delivery routes to campus rather than three 2+ ton trucks. This resulted in a 33% reduction in fuel consumption for the central receiving/distribution operation. Materiel Management is also using discretion on a daily basis to determine when routes can be combined and less trucks or smaller vehicles sent on routes. (DC)

- Property Services has combined the moving/hauling function with surplus/disposal property pickups, minimizing the number of trips needed to campus. (DC)

- Purchased seven green utility vehicles as replacements for existing trucks. (HDS)

- Athletics has purchased campus vehicles that are electric powered replacing gas powered units. (AD)

- Grounds department has purchased 8 bicycles equipped with carts for accessing campus grounds. (FM)

Future Projects:

- Replacing oldest vehicles in fleet as budget allows.

- Explore the creation of revolving Loan Pool to be used to offset the initial capital costs for alternatively fueled vehicles.

- Will develop and evaluate preventative maintenance incentive program for departments who own their own fleet.

- Promote the use of bicycles for short distance on and off campus business trips through the Buff Bikes program.

- Will partner with department of Facilities Management to pilot "right sizing" program to evaluate the department's needs on a vehicle by vehicle basis to determine optimum size and efficiency of fleet.

- Mailing Services is assessing how to combine delivery efforts in order to reduce the overall number of trips to campus per day. Eliminating one trip would save approximately 10 miles per day or 2,600 miles (173 gallons of gasoline) every year. (DC)

- Mailing Services will eliminate the bulk mail operation effective April 1, 2008. This will eliminate on trip to the USPS daily, or 2,080 miles (139 gallons of gasoline) per year. (DC)

- Convert diesel mowers to bio-diesel and explore more efficient string trimmer and leaf blowers. (FM, HMO)

Campus Wide Efficiency Opportunities

I. Renewable Energy Offsets and On-campus Production

- Since 2000 the campus has supported renewable energy in the form of on site production as well as renewable offsets. A number of small demonstration solar photovoltaic (PV) projects have been implemented on campus. The most recent is a 7kW PV installation on the UMC roof that was supported by students during 2004/2005. (E-Center)

- Currently approximately 10% of campus electricity consumption is offset by wind energy. Electricity consumption for buildings funded by student fees (UMC, Wardenburg, Rec. Center) as well as newly LEED certified buildings (Wolf Law, ATLAS, and Business School) are offset by the purchase of wind energy. We will continue to selectively consider future applications for additional wind energy offsets. (E-Center, ECO)

- A pilot outdoor solar lighting project has recently been implemented to evaluate the feasibility of outdoor solar powered LED lights. The two solar powered LED light poles are installed in front of Macky Auditorium. We are planning to add this outdoor lighting technology to our campus standards and install more solar powered LED lights in other applications. (EC/FM)

- Campus Parking and Transportation Services (PTS) has purchased and installed battery operated solar powered parking kiosks. Plans are in place to continue and expand this project going forward.

- Since the enactment of Amendment 37 and Xcel Energy Rebates for Renewable Energy Projects, we have submitted one large scale roof top PV installation project (December 2006) with third party investors. This project was not selected by Xcel. We are working on new proposals/submittals for both medium and large scale PV on campus. On site, cost effective generation of clean and renewable energy is very important for our campus from an educational point of view as well as our long term goal of CO2 neutrality.

- Currently a number of sites on the main campus are being considered for solar energy application. Portions of undeveloped South Campus are ideal for large scale, ground mounted Solar/PV installations.

- Utilize new photovoltaic technology in family housing complexes and residence halls, as allowed by the revised campus architectural standards. (HDS)

II. ESCO

- Housing & Dining services (HDS) completed an energy performance contract in 2006 to address energy conservation opportunities for 3 million square feet total in campus buildings.

- Lighting retrofits of 40,000 units changed, primarily to T8s and compact fluorescents. (HDS)

- 267 occupancy sensors installed in community rooms, lobbies, rest rooms, and laundry rooms. (HDS)

- The Student Recreation Center has completed an ESCO project with focus on the ice rink and other high energy intensity aspects of the rec. center's operations.

III. Educational & Behavioral Changes

Against the background of a very strong energy conservation education and behavioral change program that consist of pledge cards, posters, stickers, energy conservation data and trend information, we will continue or start the following programs going forward;

- Continue with our efforts to promote desktop computer power management with a focus on monitor power management and sleep mode, as well as, after hours power off. A large percentage of the 18,000 campus labs and desktops are compliant. Our goal is to make sure everyone knows how to enable the power management features of their desktop computer(s). (ECO)

- Buff Energy Star (BES) program; promotes healthy competition among all campus buildings and building proctors to save energy and reduce waste. The minimum requirements are to achieve 5% or more energy during the past 12 months compared to the previous 12 months. Participate in a building energy audit and take action in support of audit findings and recommendations. Also be the energy conservation champion and make conservation materials, stickers and posters available and visible throughout the building. We will continue to support this very successful program. (ECO)

- Continue with our campus buildings and labs energy audits. Energy audits help to identify maintenance needs and possible modifications to building systems to improve efficiency, in addition to energy conservation awareness and education. (ECO)

- Provide compact fluorescent lights to replace current incandescent lights. Several campus buildings and offices remain a target for these bulbs. This is an ongoing campaign. (E-Center/ECO)

- A residence hall energy conservation pilot will be initiated using real-time electricity usage feedback and competition incentives to motivate students. (E-Center)

- The Energy Efficiency Fund (EEF) and Energy and Climate Revolving Fund (ECRF) have been developed to provide grants or low-interest loans to 3 campus buildings for capital improvements which specifically improve the efficiency of these buildings. Combined these funds provide about $600,000 for efficiency projects. (E-Center)

- Campaigns including stickers on light switches and green office presentations to educate students and staff on the impacts of climate change and the connection between climate change and energy use. They will also serve as reminders for energy conservation actions to take on campus.

- With financial assistance from the city of Boulder, the energy program will be sending teams of students annually to two student residences in campus-adjacent neighborhoods (totaling approx. 800 residences). These teams are educating student residents on energy conservation and climate change and providing two CFLs to each residence. While the majority of the potential conservation impacts will occur in resident's homes, we expect many students to carry over these new learned behaviors, such as turning off lights and managing computer energy use, onto campus. This is an ongoing campaign. (E-Center)

- Implemented the Buff Eco Star program within the residence halls – a competition across all halls to reduce energy consumption over previous year's usage. (HDS)

- Students will be given conservation information during orientation. (HDS, E-Center)

- Will create a 2000-level energy basics course for undergraduate and graduate energy certification program in FY 07-08. The certificate programs will incorporate existing courses at UCB and new courses developed by the faculty of the UCB Energy Initiative. (EI)

- Continue with the eco-leader programs in Residence Halls (students) and in Academic/ Administrative buildings (faculty and staff). (E-Center)

- The results of the 2005 Diversion Potential Assessment show CU Recycling can expand its annual outreach efforts. Accordingly, in 2008 an interdepartmental task force will be convened to review sustainability outreach on campus with a focus on conservation behaviors. (E-Center)

IV. Campus Data Centers & Server Rooms

- *IT Load:*

  Renewal and replacement of systems is done with an eye toward both cost and energy efficiency. We are working with our primary server supplier, Sun/Root Group, to deploy more energy efficient units, and "right-sizing" systems versus the older practice of "over provisioning". This is an ongoing effort that involves approximately 160 servers and storage devices, and targets approximately 20% of these systems annually.

  We have an ongoing effort to remove decommissioned systems promptly.

  Virtually all systems are "headless", accessed through remote console or monitor/keyboard attached to a KVM switch. This reduces the number of monitors in the data center. The monitors we do have are LCD; all CRTs have long since been removed.

  A task force is being convened later this month to outline our virtualization strategy. Virtualization of servers holds the potential to consolidate hardware systems by combining multiple server functions on a single system and optimize that hardware's capabilities. This is an industry trend for "greening the Data Center (DC)" and one we are tracking closely.

- *Cooling Load:*

  We recently conducted an airflow analysis of our primary data center. This was conducted by DP Guardian, a firm specializing in data center environments. The report and recommendations identified air leaks through floor and wall penetrations, provided an overall layout for hot/cold isles to optimize airflow, and examined airflow through individual equipment racks. As a result of this analysis we installed KoldLoks to limit leakage and maintain optimal static pressure, installed blanking panels in equipment racks, and reorganized our hot/cold isles (ongoing).

  An airflow analysis will also be conducted on our switch room in the Telecomm Center. This will be completed in the next 12 months at a cost of ~$5K.

- *Cooling Efficiency:*

  The six computer room air conditioners CRAC in our two primary data centers are more than 20 years old and are mechanically inefficient. We plan to replace (1) 15-ton and (1) 20-ton units in the next 12-18 months. The remaining units would be replaced at a later date contingent on available funding. The replacement CRAC units will be high-efficiency cooling systems from Liebert or similar. The units themselves are more efficient, but will also have intelligence to adjust output to current environmental conditions, including variable-speed fan motors. Units (installed) are approximately $90K each.

  The computing labs account for approximately 1300 desktop machines. Similar practices are employed as appropriate in these facilities. That is,

systems are right sized for the particular application, LCDs are used exclusively, and monitors are set to sleep when idle. In several areas, desktop units have been replaced with laptops, which reduce power consumption and the amount of heat generated. The lab operations also maintain another ~40 servers and storage devices. These follow the practices described above for systems in the data center.

Future initiatives will look at power management and the ability to power down lab systems when they will be idle for a period of time.