

# **Campus Resource Conservation Program**

Progress Report  
Since September 2002

# Potable Water Conservation Results

- Total Campus Usage- 370,605,000 gallons (FY 02-03)
- Total Campus Usage- 326,436,000 gallons (FY 03-04)
- 11.92% Decrease in usage
- 13.9% Decrease in usage per square ft.
- Cost avoided = \$176,674
  
- Total Campus Usage- 326,436,000 gallons (FY 03-04)
- Total Campus Usage- 262,293,000 gallons (FY 04-05)
- 19.64% Decrease in usage
- 19.64% Decrease in usage per square ft.
- Cost avoided = \$256,572

# Energy Conservation Results

- Campus Electricity Usage 03-04 (kWh)
  - FY(02-03) 120,662,203
  - FY(03-04) 122,073,342
  - Reduction per sq. ft. 0.9%
  
- Campus Electricity Usage 04-05 (kWh)
  - FY(03-04) 122,073,342
  - FY(04-05) 116,392,110
  - Reduction per sq. ft. 4.65%
  - Cost Avoided \$670,385.00

# Converting Campus Restrooms to Low Water Flow Fixtures

- Completed engineering center successfully.
- Using commercially available Retro-fit kit.
- Similar work is being done at Porter & Muenzinger buildings.

# Water Conservation Projects

- July 2002 – The power house implemented a closed-loop piping network
  1. Conserves 21-million gallons/year
  2. Saves ~80,000/year
  
- Research building system (RBS) has funded this water conservation project for Joint Institute for Laboratory Astrophysics (JILA). Will use process chilled water in closed-loop piping to cool laser generators.
  1. Conserves ~25-million gallons/year
  2. Saves \$100,000/year
  3. Cost ~\$215,000
  4. Implemented: November 2004

# Water Conservation Projects

- Replaced water-driven aspirators in Cristol Chemistry with lab vacuum pumps
  1. Completed July 2003
  2. Conserves 10-million gallons/year
  3. Cost ~\$75,000
  4. Savings ~\$40,000/year
- Installed temperature sensor and control valves on two furnaces (electrical eng. Integrated Circuit Fabrication shop) and was able to reduce the water flow from 100gph to 20gph.
  1. Conserves 1.4 million gallons/year
  2. Cost ~\$3200
  3. Savings \$5600/year

# Resource Conservation Projects

- Working with Pepsi to establish an energy conservation roadmap for 200 campus vending machines (vending machine programming capability/ machines upgrade).
  - Newer vending machines (50 machines) have been programmed according to buildings schedule.
  - Timers have been added to older machines.
  - A special sticker will be installed to vending machines that are programmed for energy conservation.
  - Savings: ~ 400,000kWh, \$22,000 and 530,000 lbs CO<sub>2</sub> per year.



# Resource Conservation Projects

- Office/Classroom occupancy study and motion sensor application for lighting
  - Results favor large classroom and conference room application over offices
  - Occupancy sensor for Henderson Museum was implemented in September 2003
  - Occupancy sensor for Environmental Design Studios was implemented in December 2003
  - Occupancy sensors were added in seven electrical engineering labs in Spring 2004.
  - Occupancy sensors were added for Imig. Music main conf. Rm. In spring 2004.
  - More applications under review.
- Nominations are accepted for large classrooms/spaces for lighting control.

# Education and Awareness Campaign

## Buff Energy Star Award Program/\$1000 Cash Bonus for Building Proctor

- The Buff Energy Star Award seeks to showcase and recognize the Proctor & occupants of buildings that help the environment and the university budget by conservation.
- Fall 2004 (pilot phase).
- Selection Criteria for FY 05-06
  - Building must reduce energy use by at least 5% per ft<sup>2</sup>.
  - Presence of posters and educational materials in the building.
  - Building proctor must complete an energy audit with CECO.
  - Action in support of Audit findings by building proctor.
  - Building proctor must take active role in communicating and encouraging building occupants to conserve resources.

# Education and Awareness Campaign (contd.)

- 2004 Buff Energy Star Winners are: Fiske, Ketchum, Regent, Muenzinger, and UMC.
- Nomination Process: Building occupants may nominate Proctors and Proctors may also self nominate.

# Nightly Campus Conservation Tour

- Random selection of buildings for nightly tour.
- Focused on discovering conservation opportunities and reporting energy waste.
- Turn Unused Lights off.
- Leave instruction on how to power manage desktop computers (sleep mode).
- Report issues with building Heating/Cooling.

# Recent Initiatives

## Ice/Snow Melt

- Significant energy conservation opportunity through dual control of ice and snow melt using heat tapes (Currently activated by low outside temperature. Dual control system require presence of both moisture & low temperature for activation). The new dual control system was implemented at Old Main (Jan. 2005)
- Will apply the same control technology to the following buildings; Business, Benson, Muenzinger, Porter, Ekeley, Chemistry, and NPL

# Recent Initiatives

- Micro Turbine Energy Production
  - Completed implementation of highly efficient 30kW micro turbine at Student Recreation Center swimming pool.
  - Micro turbine has been donated by Colorado Governor Office of Energy Management.
  - Very low emission
  - Highly efficient when used in Combined Heat and Power (CHP) mode
  - Operational as of November 2004

# Recent Initiatives

- Building Re-commissioning
- Expand/Optimize Building Automation Systems, BAS (Andover)
  - Programming optimization & changes.
  - Recommission associated hardware (mechanical controls, thermostats, pressure sensor, actuators, air dampers). Adjust or replace faulty hardware.
  - Review and act on building proctor & occupant's feedback to improve comfort & energy conservation.
  - Weekly status review. Act on suggestions to improve comfort and conservation with input from recommissioning team members.
  - Implement agreed upon building schedule, Night Set Back & Smart Start Programs.

# Recent Initiatives

- Completed buildings show energy usage reduction, improved comfort, and reduction of trouble calls

ARCE	Engineering Computer Sc. Dept.	IBS5
Armory	Engineering Electrical Wng.	IBS6
Benson Arts & Sc	Engineering Mechanical Wng.	IBS7
Business	Engineering north tower	IBS8
Cristol Chem.	Engineering office tower	ITLL
CASA	Engineering south tower	RL1
DLC	Engineering stores & labs	Muenzinger
Economics	Fleming Law	Museum Collections
Ekeley Sc Bld	Hale	Norlin Library
Engineering Admin	Humanities	NPL
Engineering Aerospace	Imig. Music	MCDB
Engineering center	IBS1	Ramaley
Engineering Chemical Wing	IBS2	Speech & Language
Engineering Civil & Env'm	IBS3	University Theater
Engineering Classroom Wng	IBS4	Woodbury Arts & Sc.

Total: 45 GF Buildings

Recharge Buildings:

Police and Parking

RL2

Wardenburg Student Health

Total: 4 Recharge Buildings

# Recent Initiatives

- Re-commissioning work will start in the following buildings:

Carlson Gym

Clare Small

Computing Center

Continuing education

Denison Arts & Sc.

Duane Physics

Regent Admin Ctr.

Education

Environmental Design

Fiske Plnt.

Gates Woodruff Cottage

Guggenheim

Hellems

Henderson Bldg.

Sibell Wolle Fine Arts

Mckenna Language

Ketchum

RL 4

Macky Auditorium

Mathematics

Old Main

Stadium

- Will Continue to cover all major campus buildings
- Completed BAS Training and Trouble shooting course for control shop staff.
- Average Re-commissioning cost per building is about \$15,000 (including hardware repair & software updates).
- We have recently started scheduling buildings for holidays, after hours and night setback.

# Recent Initiatives

- Steam Traps Managements
  - Systematic inspection process to detect faulty steam traps
  - Replaced all 194 high pressure steam traps with new technology traps with failure indicator, “trap alert” December 2004.
  - Will Focus on medium and low pressure steam traps
  - Explore smart master steam valve for buildings. Regulate steam flow to buildings based on out door temperature.

# Recent Initiatives

- All 50 campus boilers were Re-commissioned during Feb. & March 2005.
- Boiler Re-commissioning project focused on testing safety features, testing all hardware, adjusting combustion settings and improve efficiency.
- Improved fuel efficiency (natural gas) and fewer customer complaints.

# Leadership in Energy and Environmental Design (LEED)

- Student and campus leadership have decided to apply LEED sustainable design principles to new building construction.
- New law & ATLAS building design have been updated for LEED principles (site, water, energy, materials and indoor air quality) with Goal of Silver or better rating.
- Through extensive design reviews and pragmatic approach to LEED elective points, we expect enough points for strong LEED Silver rating (pending USGBC review & approval).
- Campus design & construction standards have been updated in support of LEED Silver rating.

# Weather Strip Older Building Windows to Conserve Energy & Improve Comfort

- RL-1 completed June 2005.
- Weather stripping has started on theater windows.
- A special sticker is being applied to common area windows to remind occupants to close windows.



# Long-Term Initiatives (2005-2006)

- Make building occupants aware of
  - Relationship of budget to energy usage
  - Energy cost data (per building) was recently added to Conservation website.
- Explore renewable energy/alternative energy for selected campus applications
  - Solar, Wind, Biomass, Micro turbine, Fuel Cell

# Long Term Initiatives

- Academic/ Research Labs are 5-10 times more energy intense than offices and classrooms.
  - Bench mark lab fume hoods operation and lab air changes (maintain safety).
  - Apply Labs 21 principles for new labs construction.
  - Labs equipment power management/ sleep mode (Autoclaves, sterilizers)
  - Economical replacement/ consolidation of older, high energy usage equipment (freezers, refrigerators).
  - Considering several Heat Recovery projects (CIRES)
  - Labs energy audits and conservation tips are posted at conservation website.

# Campus Resource Conservation Program

See energy waste at CU-Boulder?

Call (303) 735-6202

or hotmail: [energyconservationhotline@fm.colorado.edu](mailto:energyconservationhotline@fm.colorado.edu)



Water waste?

Call (303) 735-6202

Or Repair – (303) 492-5522



Too Bright? Go to <http://fm.colorado.edu> – click on “Delamp Request”

Or Call (303) 735-6202

Or for Repair – (303) 492-5522