Energy Conservation Outreach Plan
(ECO Plan)
For Humboldt State University

ENVS 410
Spring 2004
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Phase I: Defining the Problem

Problem Statement

Humboldt State University (HSU) lacks an Energy Conservation Outreach Plan. The Humboldt State University community prides itself on being ecologically minded and leaving a small footprint, which would only be enhanced by developing and implementing an outreach plan.

Problem Situation

Rollin Richmond, president of HSU, called for a goal of energy conservation while maintaining services as a strategy for meeting the current budget reductions. This task was delegated to the Schatz Energy Research Center (The Center).

The Center developed a list of possible tasks to conserve energy on campus (see appendix for SERC Task Sheet) and decided a task force was needed. In conjunction with the Environmental Science Practicum course of the spring semester in 2004, the following students: Elizabeth Trent, Elise Trent, Jessica Barr, and Emily Drewek adopted the program and called themselves Task Force 11. The team decided that it was necessary to do the following:

- Gauge the climate of the college by informal surveys of staff and students.
- Obtain interviews with Bob Schultz Head of Physical Facilities on what the college is doing now to conserve energy.
- Research other colleges to see their insights into the perceived problems of energy conservation.
- Contact departments on the feasibility of distributing a survey to see the perceive problems.

The findings of the informal polls were that the prevailing attitude is students' indifference, they felt that "by saving money with energy conservation would only line the pockets of the administration" or that since the fees were so high it was owed them. The faculty feels they sacrifice enough that giving up their comforts of a space heater or other small appliance was asking too much, but they were more willing to consider it. The staff felt that they were left out of the decisions totally.

Plant Operations, Chief Engineer, George Wright keeps a monthly energy report of the energy consumption on campus. Plant Operations estimates an energy budget for the expected amount of energy used on campus each month in each school year with consideration to the fluctuation of utility rates over time. This energy budget is through the General Fund for HSU and does not include campus housing and other non-educational facilities such as the University Center. A few of these facilities that are not completely isolated from the campus energy system are tracked and billed for their energy consumption by Plant Operations.

The utility bills showed the increase continued even with the improvements. The energy sources used on the campus of Humboldt State University are electricity and natural gas. The electricity is supplied by a two-year contract with Arizona Public Service (APS) for $0.0625/kwh and transported through Pacific Gas and Electric (PG&E) at fluctuating rates that averages around $0.12/kwh. The fluctuating rates with PG&E are throughout the year and at peak hours of the day. The natural gas for campus is of two supply sources; 70% of the natural gas comes from a five-year contract with the Department of General Services at a fixed rate of $0.42-0.43/therm

plus a transportation cost of $0.20/therm; 30% of the natural gas called "pooled gas" is then bought through commodity trading at a near cost as the contracted natural gas.

In the past couple of years the campus energy costs have averaged around $1.5 million dollars. The amount of energy used this school year (2003-2004) has increased. A few possible explanations for the increased usage include: weather conditions have been worse this year and causes an increase in energy use, possible change in course schedule with increased night courses, and/or may be due to behavior differences on campus. Last school year 2002-2003, it is believed that the campus community was more conscience of energy use with the rolling blackouts that were occurring. Plant Operations believes that all actions have been taken to provide the most efficient infrastructure throughout the facilities on campus and that the problem there lies in the behavior of the campus community.

However, the message that was presented at the HSU Budget Summit, February 20, 2004, about the issue of energy consumption on campus was that it will continue to escalate. This was also supported by the statewide CSU estimation of energy cost increasing by $4 million. It was felt that energy conservation would not be addressed from the administration level and thus supported our need to develop an outreach plan to empower the entire campus community with the task of energy conservation.

Indeed the CSU Committee on Campus Planning, Buildings and Grounds is presently revising the current energy policy to incorporate new goals and requirements for energy use for CSU facilities. This policy draft is an update to a 2001 revision of the original 1978 energy policy. The draft revision includes statements such as *sustainable design* and *energy efficiency*. However, these terms were never defined. Since the

beginning, the CSU policy had stated that the universities would "inform students, faculty, staff and the general public of the need for and the methods of energy conservation and utilities management" to meet conservation objectives throughout the state. The energy policy also states "all lighting, except what is required for security purposes, will be turned off when buildings and facilities are unoccupied". The policy also encourages the conservation of energy on campuses through incentive plans to recognize and reward the campus community for actions taken *beyond normal expectations.*

These findings led to researching other campuses. In office buildings the single most effective measure to take is turning off computers when not in use. This has also been implemented on college campuses elsewhere. One example is Harvard. According to their website, a single computer running all day uses $115-$160 worth of electricity.

We discovered that, contrary to popular belief, computers are not adversely affected by being frequently shut down. This was proven by studies conducted at the Lawrence Berkeley National Laboratory. Actually, the reduced heat stress resulting from turning it off when not in use could prolong the life of a computer.(*Harvard, Computer Energy Reduction Program, http://www.greencampus.harvard.edu/CERP/faqs.shtm*)

Also we found that PG&E recommends the following behavior modifications aimed at energy conservation in schools:

- Turning off unnecessary lights can save up to 20% of lighting energy.
- Setting thermostats to 68 degrees F for heating can save up to 5% on heating costs per degree.

- Limiting after-hours activities to designated areas and turning off the heating/cooling mechanisms elsewhere can save up to 25% of heating/cooling costs.(*Pacific Gas and Electric Company, Energy Reduction Action Plan for Schools, http://www.pge.com/rebates/123_reduction_plans/schools/index.html*)

When we see that actions as simple as turning off unused lights and computers can have such a significant impact on energy reduction, it becomes clear that behavior, not just technology, is an important factor in the quantity of energy being consumed here on our campus.

The research also led to several studies of dorm facilities. Significant drops in energy use at multiple locations resulted from offering incentives to the residents. For instance at two universities (Ohio State and University of Montana), incentives were used with positive results in the dorm. (http://footprint.mit.edu/energy/dorms.html)

The outreach to the departments and staff was met with great enthusiasm. It seemed that the perception was that the administration simply dictates policy. That they could contribute their perceptions on what the problem is and give their insight on how to correct it is to them a great way to see the problem.

This perception of not making a difference and not having power, lead to the discussion that part of the problem was the *Tragedy of the Commons*. The campus to be efficient would need to be empowered and franchised.

The final piece of the problem came when talking to Dr. Richard Engel of the Schatz Energy Research Center. The Center had great ideas about what could and should be done but there was no cohesive plan.

What the HSU campus needs, in order to make an earnest effort to decrease energy consumption, is unification and organization. We need to find a way to work together to achieve a more efficient operation. This will require a plan. The plan needs to be inclusive, which will require a wide range of input during its formation, as well as cooperation during its implementation.

Phase II: Goals and Objectives

Goal 1: To design a successful energy conservation outreach (ECO) plan for Humboldt State University (HSU).

Objectives

1. To have an ECO plan which can be easily implemented within one academic year.
2. To have a plan which promotes energy savings on campus.
3. To have a plan which is rewarding to 8-10% of its participants in the campus community.
4. To have a plan which empowers 4% of the faculty and staff at HSU.
5. To have a plan that utilizes several outreach methods.
6. To have a plan that provides an educational service to the majority of those involved with the university.

Goal 2: To engage a large portion of the HSU community in the implementation of the ECO plan.

Objectives

1. To provide roles within the plan for at least four academic departments.
2. To receive a willing response from those departments asked to participate.

Phase III: Alternate Solutions

The following are the alternate solutions to the need for energy conservation education on the Humboldt State University campus.

1. Posters
2. Graphs
3. GIS Map on display
4. Dorm incentives
5. Web Page
6. Staff/faculty outreach
7. Skits
8. Stickers
9. Media coverage (Lumber Jack and KRFH)
10. Interdepartmental involvement
11. Weekly announcement
12. Referrals
13. Advisement to physical plant for turning off lights not in use.
14. Updates at staff meeting on state of the energy on campus
15. Consolidating class to conserve energy
16. Turning off computers at night
17. Electric switch to motion sensors
18. Guest speakers like Oprah Winfrey
19. Students pedaling ergo magnetic bikes to produce electricity
20. Administrators pedaling for power
21. Converting the campus to total solar power within ten years

These goals were reduced by nine including Numbers 13, 15, 16, 17, and 21 as being incompatible with our educational outreach goals. Numbers 18 and 21 are not financial feasible. Numbers 19 and 20 would disenfranchise certain members of the campus community. And we concluded that forcing the administrators and students to pedal to reduce power usage would not promote unity.

Using the following spreadsheet in Table 3.1, we determined that a comprehensible plan that incorporated all of these solutions would be best.

Table 3.1 Decision Matrix

Alternate Number (Mentioned above)	Educational	Utilize Several Media	Potential to be Rewarding to 8-10% Of Campus community	Potential to be Empowers 4-10 % of Faculty/staff	Provide Educational outreach to a majority of HSU	Able to be implemented in one year	Provide Roles for at least 1 dept.	Promotes Energy Savings
1	+	-	-	-	+	+	+	+
2	+	-	-	-	-	+	+	+
3	+	-	-	-	+	+	+	+
4	-	-	+	-	-	-	-	+
5	+	-	+	-	+	+	+	+
6	+	-	+	+	-	+	-	+
7	+	-	-	-	-	-	+	+
8	+	-	-	-	+	+	+	+
9	+	+	-	-	+	+	+	+
10	-	-	-	+	-	+	-	-
11	+	+	-	-	-	-	-	+
12	+	-	+	-	-	-	-	+
14	+	-	-	+	-	+	-	+

By the above decision matrix we found that the strongest solutions covering our goals and objectives were the web page and the media coverage. However, by combining poster, graphs, GIS map, stickers, skits under the interdepartmental involvement category the strength of the individual solutions would be increased. On further reflection it was decided that combining all of the solutions into a master plan would be the most productive method.

Phase IV: Implementation Strategies

The individual alternative solutions we have combined into our campus conservation outreach plan will be implemented according to the timeline below:

Date	Team Member	Solution	Contact	Contact Name Phone Room	Implementation Date
April 24, 2004	Elizabeth Trent	Poster, Stickers	Art Department	James Crawford 826-3624 ART 121	Fall 2004
	Elise Trent	Web Page	Engineering Department	Elizabeth Eschenbach House 18 826-3619	Fall 2004
	Jessica Barr	GIS Map	NRPI Department	Professor Steinberg NPRI 826-3202	Fall 2004
	Emily Drewek	Dorm incentives	Housing		Fall 2004
	Emily Drewek	Media Coverage	Lumberjack and KRFH		Fall 2004
	Elizabeth Trent	Skits	Theater Department	Department Chair Linda Sievers TA 20 826-3566	Fall 2004

Date	Team Member	Action	Findings/Contacts
May 1, 2004	Elizabeth Trent	Present to Group follow-up of contacts with Art and Theater Department	Contact Completed
	Emily Drewek	Present to Group follow-up on housing and media	Green Campus is working with campus housing, Public Service Announcement for KRFH
	Jessica Barr	Present follow up on GIS contact and present graphs on survey results and energy usage	GIS letter emailed to Steinberg, Energy and survey graphs included in master document, presentation and to SERC for future implementation
	Elise Trent	Present follow of contact and mock web page	Contact Completed web page deferred to fall

The team will present this plan to Richard Engel at his request. All activities to be done in conjunction with any course on campus will be finalized with instructors by the second week of August to implement projects into the course work by the fall 2004 semester. All implementation in fall will be followed-up by docents under the supervision of Richard Engel and Schatz Energy Research Center. This follow-up will include referrals for the web page, weekly announcements, and staff updates that will be incorporated.

Phase V: Monitoring and Evaluation

The monitoring and evaluation of our campus conservation outreach plan will be on an annual basis by docents or staff of the Schatz Energy Research Center. The initial surveys we already administered to both the students and staff/faculty will serve as a baseline to measure any changes within the campus community. Follow-up surveys (see appendix) administered on an annual basis will be used to monitor and evaluate the effect of the components implemented by our plan.

Records of annual energy use for the campus can help indicate energy conservation in comparison to the average trends graphed below (See figures Phase V: 1a-c). Other variations in energy use on campus are not apparent by the annual reports and must be considered while interpreting the numerical figures, such as the installation of more efficient light fixtures, extreme weather conditions, technical problems in certain buildings, etc. For as is shown though the energy consumption rate has decreased due to improvements and awareness of the energy crisis, there is a definite decrease in the amount of energy used per campus member over time.

Figure Phase V: 1a

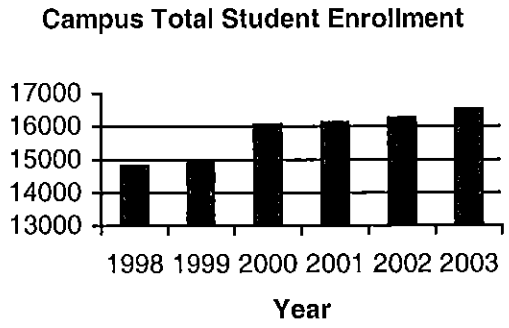


Figure Phase V: 1b

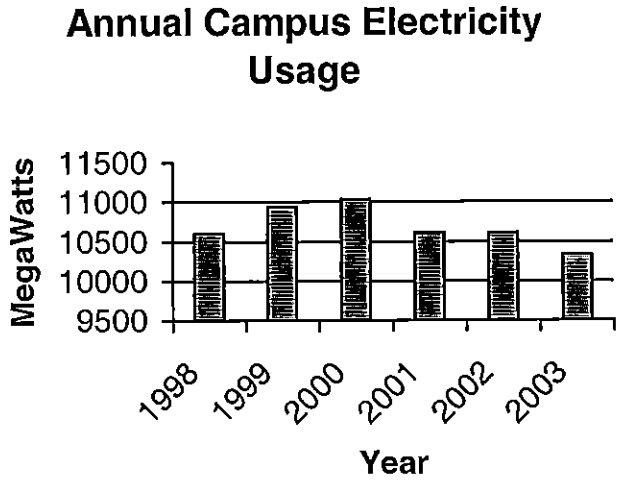
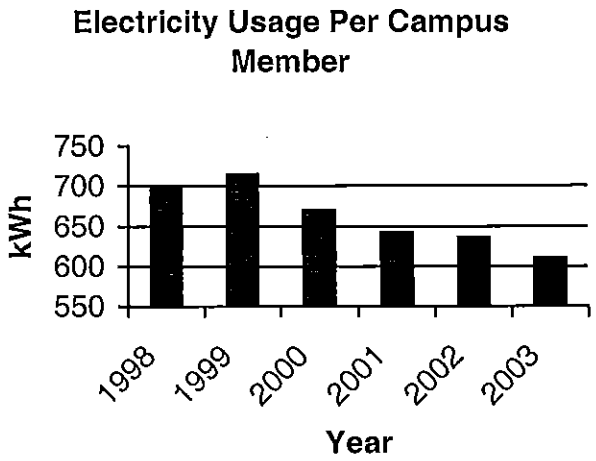


Figure Phase V: 1c



Appendices

HSU Memo and DRAFT CSU Policy

President Rollin's Energy Memo

September 17, 2003

Campus Community,

The drastic budget cuts we are experiencing are affecting many of the services that we provide on campus including the security of our facilities. In order to ensure the safety of our students, our University Police are concentrating on oversight of our residence halls and many academic facilities. However, they do not have the resources to ensure that all buildings are locked promptly and checked frequently. I ask that you help us in this process by closing and locking office doors at the end of the day, closing windows in classrooms at the end of the day, ensuring that if you enter a locked building that the door locks behind you and generally being aware of small chores that preserve our security and facilities. Please treat our campus as if it were your home and act accordingly. It is very important that any security risks you are not able to resolve are reported immediately to the University Police Department, extension #3456. Energy costs continue to be a significant proportion of our annual budget. In an effort to circumvent even deeper reductions to divisions, I am counting on you to help the University realize several hundred thousand dollars in energy savings this year. I hope you will join with me to help reduce these costs by conserving energy whenever you can. Please turn off the light when you leave a room, turn off your computer when you leave for the day and try to find other ways that you can help to reduce our energy costs. Thank you for your assistance with these issues and for your patience and understanding of the consequences of budget reduction.

Rollin

DRAFT CSU POLICY

COMMITTEE ON CAMPUS PLANNING, BUILDINGS AND GROUNDS

Revised Policy on Energy Conservation, Sustainable Building Practices, and Physical Plant Management

Presentation By

Elvyra F. San Juan
Assistant Vice Chancellor
Capital Planning, Design and Construction

Summary

This item requests Board of Trustees' approval of a revised Policy on Energy Conservation, Sustainable Building Practices, and Physical Plant Management.

Background

The current energy policy has been in place since 1978 and revised in 2001 to incorporate revised goals and requirements for energy performance in CSU facilities. The 1978 policy achieved a 33% energy reduction from the 1973/74 baseline through 1999/00 expressed in BTUs (British Thermal Units) per square foot of gross floor area. The current (2001) policy established a goal of 15% reduction in energy consumption by 2004/05, as compared to the new baseline year of 1999/00. We are pleased to inform the Board of Trustees that the system is on track toward exceeding this goal by 3%.

In order to meet the demands of its academic mission, the CSU pursues and maintains a wide-ranging capital building and renovation program. There are twenty-three campuses statewide, plus off-campus centers. Geography and microclimates of our campuses range from the northern coastal campus at Humboldt to the arid-desert climate at Bakersfield. The range of academic and university requirements, age and inventory of existing buildings, and diverse climatic environments establishes unique sets of programmatic requirements for facilities in the CSU system. The CSU currently has over sixty million gross square feet (60,289,000 gsf) of state and nonstate facilities, and has two billion dollars for new and renovation projects in design or construction.

Proposal

As a leading public higher education institution, the CSU has an obligation and a responsibility to lead the way in California's energy conservation and sustainable building practice efforts. The CSU must continue to identify methodologies to render more efficient physical plant management for the years to come.

In addition, the state of California has moved to further improve energy efficiency and resource-efficient building practices. This item proposes a revised policy to acknowledge the governor's executive order and be responsive to the current needs and future trends in sustainable building practices. The new policy is titled: California State University Policy on Energy Conservation, Sustainable Building Practices, and Physical Plant Management. The revised policy aligns CSU policy with the governor's executive order D-16-00 on sustainability.

Based on the achievements to-date and the broad areas of opportunity for energy efficiency and lowered environmental impacts, the new policy focuses on defining strong systemwide goals, while allowing individual project solutions and response based on location, academic program needs, and available funding.

The proposed policy promotes responsible stewardship of state and nonstate facilities that aims to provide the best learning and working environment possible for our students, faculty and staff. The proposed CSU goal is to plan, design, construct, operate, and maintain campus facilities and infrastructure to minimize impacts on the environment. In order to achieve this goal, the policy incorporates guiding principles of energy efficiency, sustainable design, system reliability, energy security, energy supply diversity, and integrated resource planning.

Proposed Policy on Energy Conservation, Sustainable Building Practices, and Physical Plant Management

The proposed CSU policy on Energy Conservation, Sustainable Building Practices, and Physical Plant Management follows (changes from previous policy shown in italics and strike-thru):

Energy Conservation

1. All CSU buildings and facilities, regardless of the source of funding for their operation, will be operated in the most energy efficient manner without endangering public health and safety and without diminishing the quality of education.

2. All CSU campuses will continue to identify energy efficiency improvement measures to the greatest extent possible, undertake all necessary steps to seek funding for their implementation and, upon securing availability of funds, expeditiously implement the measures.

3. The CSU will promote the use of cost effective renewable non-depleting energy sources, wherever possible, both in new construction projects and in existing buildings and facilities. The campuses will consider the implementation of load shifting technologies such as thermal energy storage.

4. The CSU will take the necessary steps to provide adequate, reliable, and cost effective utilities infrastructure at all campuses for meeting the needs of present and planned buildings and facilities.

5. The CSU will actively seek all available sources of funding for implementing energy efficiency improvement and utilities infrastructure renewal projects. Funding sources will include federal and state budget appropriations, federal, state and private sector grants opportunities, and other unique public/private sector financing arrangements, which have been made available through legislative actions in California and the United States Congress. In the event these funding sources are unable to meet the requirements for an approved energy program, priorities within the existing support appropriations will be examined to determine if funds could be made available for project development purposes.

6. The CSU will cooperate with federal, state and local governments and other appropriate organizations in accomplishing energy conservation and utilities management objectives throughout the state; and inform students, faculty, staff and the general public of the need for and methods of energy conservation and utilities management.

7. Each CSU campus will designate an energy/utilities manager with the responsibility and the authority for carrying out energy conservation and utilities management programs. The Chancellor's Office will have the responsibility to coordinate the individual campus programs into a system wide program.

8. The CSU will monitor energy usage monthly on all campuses and the Chancellor's Office, and prepare a system wide annual report on energy utilization. The Chancellor's Office will maintain a system wide energy database in which monthly campus data will be compiled to produce system wide energy reporting. Campuses will provide the Chancellor's Office the necessary energy and utility data for the system wide database in a timely manner.

9. Each CSU campus will develop and maintain a campus wide *integrated* strategic energy *resource* plan, which will include tactical recommendations in the areas of new construction, deferred maintenance, facility renewal, energy projects, *water conservation, solid waste management* and a structured energy management plan. This plan will drive the overall energy program at each campus.

10. To monitor the effects of energy conservation efforts on instructional programs and the environment, the campus energy/utilities manager shall solicit and evaluate feedback from faculty, staff, and students. Training on new energy management concepts and programs will be provided as necessary.

11. *A component of each campus's emergency plan shall address action required to respond to* short-term electrical outages, large-scale grid failures, natural gas curtailments, *and other utility shortages or failures.*

Sustainable Building Practices

1. All future CSU new construction, remodeling, renovation, and repair projects will be designed with consideration of optimum energy utilization, low life cycle operating costs, and compliance with all applicable energy codes (enhanced Title 24 energy codes) and regulations. In instances where a project's current funding does not include energy *or sustainable design* features consistent with low life cycle costing, augmentations will be sought, when warranted. In the areas of specialized construction that are not regulated through the current energy codes, such as historical buildings, museums, and auditoriums, the CSU will consider energy efficient and sustainable design features in the project plans and specifications in balance with the academic program needs of the project within the available project budget.

2. *Capital planning for state and nonstate facilities and infrastructure shall consider features of a sustainable and durable design to achieve a low life cycle cost. Principles and best practices established by leading industry standards or professional organizations shall be implemented to the greatest extent possible. The CSU is supportive of campuses pursuing third-party accreditation for campus facilities, however current Department of Finance (DOF) policy does not permit the use of state capital funds for such administrative costs. Therefore, campuses considering outside accreditation shall identify alternative means of funding for associated costs.*

3. *Sustainable design for capital projects is a process of balancing long-term human needs with environmental concerns. In the context of designing to provide for university and academic needs, the following attributes are considered "sustainable":*

   a. *Siting and design considerations that optimize local geographic features to improve sustainability of the project, such as proximity to public transportation and maximizing use of vistas, microclimate, and prevailing winds;*

   b. *Durable systems and finishes with long life cycles that minimize maintenance and*

replacement;

c. *Optimization of layouts and systems to ensure longer life and re-use of capital projects;*

d. *Systems designed for optimization of energy, water, and other natural resources;*

e. *Optimization of indoor environmental quality for occupants;*

f. *Utilization of environmentally preferable products and processes, such as recycled-content materials and recyclable materials;*

g. *Procedures that monitor, trend, and report operational performance as compared to the optimal design and operating parameters.*

4. *The objective is to implement the sustainable building goal in a cost effective manner. The process will: identify economic and environmental performance measures; determine cost savings; use extended life cycle costing; and adopt an integrated systems approach. Such an approach treats the entire building as one system and recognizes that individual building features, such as lighting, windows, heating and cooling systems, or control systems are not stand-alone systems.*

5. *The CSU encourages the use of materials and systems with reduced environmental impacts. The design team (architect/engineer) shall recommend building materials and methods with life cycles (manufacture, installation, maintenance, repair, and replacement) of reduced environmental impacts. Considerations shall include energy efficiency, energy required in the manufacturing process, life cycle duration, and maintenance and replacement costs.*

Physical Plant Management

1. Purchased energy resources on CSU facilities will not be used to heat above 68°F or cool below 78° F. Domestic hot water temperatures will not be set above 115° F. These limits will not apply in areas where other temperature settings are required by law or by specialized needs of equipment or scientific experimentation.

2. Each campus shall operate and maintain a computerized energy management system that will provide centralized reporting and control of the campus energy related activities.

3. Campus energy/utilities managers will make the necessary arrangements to achieve optimum efficiency in the use of natural gas, electricity, or any other purchased energy resources to meet the heating, cooling, and lighting needs of the buildings and/or facilities. Except for areas requiring special operating conditions, such as electronic data processing facilities, or other scientifically critical areas, where rigid temperature controls are required, building and/or facility temperatures will be allowed to fluctuate between the limits stated above. Simultaneous heating and cooling operations to maintain a specific temperature in work areas will not be allowed unless special operating conditions dictate such a scheme to be implemented.

4. Scheduling of building and/or facility usage will be optimized consistent with the approved academic and non-academic programs to reduce the number of buildings operating at partial or low occupancy. To the extent possible, academic and non-academic programs will be consolidated in a manner to achieve the highest building utilization. Further, the scheduling of buildings will be implemented in a manner to promote central plant and individual building air conditioning system shutdown to the greatest extent possible during the weekend and other holiday periods. Campus energy/utilities managers will make all attempts to change or update building operating schedules to match the changes in the academic programs on a continuing basis.

5. All air conditioning equipment, including supply and return air fans, are to be shut off on weekends, holidays, and for varying periods each night, except where it would adversely affect instruction, electronic data processing installations, or other scientifically-critical or 24-hour operations.

6. Campuses will participate in state sponsored demand reduction programs, where practical, during periods of CAISO *(California Independent System Operator)* Stage Alerts. Reductions in non-critical loads will be made in an effort to aid in the state electrical grid integrity.

7. Outdoor air ventilation will be set at 10 cfm/person or such other higher limits as prescribed by state law or regulations. This restriction does not apply to situations where 100% outside air is called for by properly installed and tuned economizer cycles.

8. All windows in buildings and/or facilities that are air-conditioned will be kept closed and as secure as possible to prevent loss of conditioned air.

9. Portable electric heaters and fans are not to be used in CSU facilities unless specifically required by occupants because of medical conditions, failure of the building heating, ventilating or air conditioning systems, or when building heating, ventilating or air conditioning systems cannot be adjusted to achieve minimum comfort levels within the provisions established under Item No. 1. Campus energy/utilities managers will grant such exemptions on a case-by-case basis. Use of refrigerators for non-instructional purposes should be consistent with good energy management practices. Each campus will prepare their own guidelines to discourage proliferation of personal refrigerators.

10. All lighting, except what is required for security purposes, will be turned off when buildings and facilities are unoccupied, such as at the end of the workday. Custodial personnel will turn lights back on only for the time actually required for custodial work.

11. All CSU campuses will, to the greatest extent possible, change custodial hours from evening/night shifts to day shifts to reduce custodial energy usage. Any revisions to the custodial shift schedule will be made in consultation with the energy/utilities manager. Building ventilation and lighting systems will not be operated any more or longer than what is required under health and safety codes during the low load custodial occupancy periods.

12. Indoor lighting will be reduced in number and/or wattage, wherever possible, to provide for the minimum but adequate lighting levels consistent with the needs of instructional programs and state-mandated standards for the efficient and effective use of the space. Existing incandescent lamps for general-purpose lighting will be phased out and future incandescent lamps will not be allowed unless exempted for very limited and specialized tasks by the campus energy/utilities managers. New lighting systems will be in the form of the latest energy saving technology.

13. Outside lighting on building exteriors and campus grounds will be maintained at levels necessary to provide security and safety to promote confidence within the campus community. Good energy management practices shall be observed within this guideline.

14. Purely decorative lighting on CSU campuses beyond reasonable display lighting, inside or outside, will not be added. Existing decorative lighting beyond reasonable display lighting will be eliminated on a continuing basis. In general, decorative lighting will not be used for commercial or holiday purposes unless specifically exempted by the campus president.

15. All natural gas fired boilers on the campuses will be tuned at least twice annually, and brought up to maximum efficiency unless automated combustion controls are installed. In the case of automatic controls, verification of combustion efficiency shall be conducted routinely or at

least ~~once~~ monthly for central plant and quarterly for decentralized boilers. A permanent record of these readings will be maintained on each campus.

16. All CSU campuses will maintain their energy plant and utilities infrastructure improvements in good working order and will undertake preventive maintenance schedules to maintain the highest possible system efficiencies and, hence, the lowest operating costs.

17. When replacing energy consuming and/or utilities infrastructure equipment, the most cost effective models will be selected. Life cycle costing procedures, instead of first capital cost only, will be utilized as the basis for all future equipment selection. All possible efforts will be made to secure additional funding if required to effect lowest life cycle procurement.

18. All CSU campuses will implement a utilities charge back system to recover costs of utilities provided to self-support and external organizations.

19. All CSU campuses will take every necessary step to conserve water resources, including such steps as installing controls to optimize irrigation water, reducing water usage in restrooms and showers, and promoting the use of reclaimed water. The use of decorative fountains should be minimized. In the event of a declaration of drought, the CSU will cooperate with the state, city, and county governments to the greatest extent possible to effect additional water conservation.

20. The CSU will encourage continued energy conservation and lowest utilities operating costs on its campuses by instituting ~~appropriate fiscally responsible~~ incentive plans designed to recognize and reward meritorious achievements by campus staff, faculty, and students beyond normal expectation. These incentive plans will be designed in such a fashion that they are adaptable to changing budget constraints from year to year.

Action

The following resolution is recommended for approval:

WHEREAS, the Board of Trustees of The California State University has historically supported an aggressive CSU energy conservation and utilities management policy and program; and

WHEREAS, the California State University has exceeded energy conservation and reduction goals set forth in previous policies; and

WHEREAS, sustainable building practices utilize energy, water, and materials efficiently throughout the building life cycle; enhance indoor air quality; improve occupants' health, comfort and productivity; incorporate environmentally preferable products; and thereby substantially reduce the environmental impacts associated with long-term building operations without compromising building performance or fulfilling the academic mission; and

WHEREAS, energy costs in California are projected to increase significantly in the next decade and such increases are estimated to take a greater percentage of the California State University operating budget, now, therefore be it

RESOLVED, by the Board of Trustees of the California State University, that the goal is to site, design, deconstruct, construct, renovate, operate, and maintain campus facilities and infrastructure that endeavor to be models of energy, water, and materials efficiency, while providing healthy, productive, and comfortable indoor environments and long-term benefits to faculty, staff, and students; and be it further

RESOLVED, that the California State University shall facilitate the incorporation of sustainable building practices into the planning and operations of campus facilities. The objectives are to implement the sustainable building goal in a cost effective manner, and be it further

RESOLVED, that the revised CSU Policy on Energy Conservation, Sustainable Building Practices, and Physical Plant Management in Agenda Item #7 of the March 16-17, 2004 meeting of the Trustees' Committee on Campus Planning, Buildings and Grounds is adopted; and be it further

RESOLVED, that the chancellor or his designee is authorized to take the necessary steps to implement the intent of this policy.

SERC Task Sheet

HSU Energy Conservation
List of Possible Tasks

PLANNING AND PREPARATION

Task 1: Plan a strategy with Rollin Richmond to reach goal of maintaining services while reducing energy use.

Task 2: Attend seminar: Fostering Sustainable Behavior (Michael - October 8th).

Task 3: Obtain student helpers. Meet with Renewable Energy Students' Union students.

Task 4: Meet with Bob Schulz (Director, Physical Services) and George Wright (Chief Engineer, Plant Operations), Bill Cannon (Director, Information Technology Services), and R.J. Wilson (Manager, Academic Computing) to acquire data and plan an energy use reduction strategy.

Task 5: Perform statistical analysis of use patterns from current data for each building. This analysis may help determine what changes should happen first. Determine various ways that energy is used and prioritize improvements starting with changes that have the highest payoff with the lowest (or no) investment.

Task 7: Present strategy and plan improvements with Sustainable Campus Task Force and President's Sustainable Campus Committee.

Task 8: Meet with Beth Eschenbach (Chair, Environmental Resources Engineering) to find students doing projects, Tom Borgers (Professor, Chemistry) to obtain established data and history, and Dick Hansis (Program Coordinator, Environmental Science) to find students doing projects. Identify student interns and projects.

Task 9: Perform review of what's been done so far, what are the possible ways of saving in large institutions.

Task 10: Review equipment modification goals and projects from Sustainable Campus Task Force (ongoing).

Task 11: Put together education and outreach plan suitable for various audiences within the university: administrators, academics, students.

IMPLEMENTATION

Task 12: Contact individual building managers to discuss operation of each building. Discuss various strategies for conserving electricity and natural gas.

Task 13: Train student interns to participate in building-to-building energy demonstrations.

Task 14: Contact budget decision-makers and unit managers to offer education and demonstration session. Train staff in energy conservation using engaging, hands-on techniques and games. Ask staff to elect energy monitor within each office. Determine major opportunities for electricity and natural gas savings for each office and make recommendations for change to staff and management.

Task 15: Create purchasing policies and monitoring procedures to require purchase of the most life-cycle cost effective equipment and require Energy Star compliant and Federal Energy Management Program low standby power devices.

Task 16: Inventory all configurable office equipment (computers, copiers, printers, fax machines, etc.) and define procedures, training, and monitoring to configure equipment for most efficient operation.

Task 17: Identify labs and other special situations (such as art department kilns) of high energy using equipment and work with users to measure existing energy use, develop schedules, procedures, and monitoring for most energy efficient operation.

Task 18: Identify all natural gas users (space and water heating, pool heat, food services, laundry facilities) and reduce usage when possible in accordance with demand or schedule of use.

Task 19: Create a web page showing elements of energy demonstrations, and month-to-month energy use reductions per building. Create a CCAT workshop to be held twice annually, and a brochure to be distributed to a general audience. Give special recognition to departments or buildings achieving the greatest improvements and highest efficiency.

Task 20: Report to president and budget decision-makers all energy use reductions.

Surveys

ENVS 410 Energy Conservation Survey
(Staff/Faculty)

This survey is being administered by a group of Environmental Science Practicum students seeking to gain input from the campus community. Our group is working in consultation with the Schatz Energy Research Center. The responses to this survey will remain anonymous, and will serve solely as a basis for our energy study.

1) Do you feel energy is being overused on campus?
   ☐ Yes ☐ No

2) Where are you more aware of energy conservation?
   ☐ On Campus ☐ At Home
   ☐ Neither ☐ Both
   If so why?

3) Where on campus do you see energy being most overused?

4) What do you perceive as the problem?

5) Who should be responsible for overseeing the conservation of energy on campus?
   ☐ University Administration ☐ Plant Operations
   ☐ Within departments ☐ Individuals
   ☐ Other (Please state)

6) Do you ever leave on:
   ☐ Computer ☐ Lights
   If so why?

7) Is your office temperature comfortable?

   If not, what problems do you have, and what do you do to compensate?

8) Any suggestions or observations about energy use on campus:

ENVS 410 Energy Conservation Survey
(Student)

This survey is being administered by a group of Environmental Science Practicum students seeking to gain input from the campus community. Our group is working in consultation with the Schatz Energy Research Center. The responses to this survey will remain anonymous, and will serve solely as a basis for our energy study.

1) Where do you live?
☐ On Campus ☐ Off Campus

2) Do you feel energy is being overused on campus?
☐ Yes ☐ No

3) Where are you more aware of energy conservation?
☐ On Campus ☐ At Home
☐ Neither ☐ Both
If so why?

4) Where on campus do you see energy being most overused?

5) What do you perceive as the problem?

6) Who should be responsible for overseeing the conservation of energy on Campus?
☐ University Administration ☐ Faculty ☐ Sudents
☐ Other (Please state)

7) Do you ever notice lights left on after the students have left for the day?
☐ Yes ☐ No

If so do you turn them off?
☐ Yes ☐ No

8) Are your classrooms or other gathering place's temperatures comfortable?
☐ Yes ☐ No
If not, what problems do you have, and what do you do to compensate?

9) Any suggestions or observations about energy use on campus:

Faculty/Staff Survey – Quantitative Results

Faculty/Staff Quantitative Results			
Question	Total Surveys	144	%
#1: Do you feel energy is being overused on campus?			
	Yes	96	66.7
	No	39	27.1
	No comment	9	6.3
#2: Where are you more aware of energy conservation?			
	On Campus	5	3.5
	At Home	58	40.3
	Both	79	54.9
	Neither	1	0.7
	No comment	1	0.7
#5: Who should be responsible for overseeing the conservation of energy on campus?			
	Total Comments	279	
	U. Admin.	55	19.7
	Plant Ops	68	24.4
	Dept.	54	19.4
	Individuals	86	30.8
	No comment	11	3.9
	Other	5	1.8
#6: Do you ever leave on computers or lights?			
	Computer	49	34.0
	Lights	8	5.6
	Both	11	7.6
	Neither	51	35.4
	No comment	25	17.4
#7: Is you office temperature comfortable?			
	Comfortable	76	52.8
	Not comfortable	12	8.3
	Too hot	19	13.2
	Too cold	28	19.4
	No comment	9	6.3

Faculty/Staff Survey - Qualitative Results

Question #1: Do you feel energy is being over used on the campus?

- There is always room for improvement

Question #2: Where are you more aware of energy conservation?

- Four people-energy cost money
- One person-socially unacceptable
- Three people-at home I am in control of energy
- Two people-I care about the environment and stewardship
- Two people-at home it is my lifestyle

Question #3: Where on campus do you see energy being most overused?

- One person-Gist Hall
- Four people-Natural Resources
- Four person-Red Wood Bowl
- One person-Annex
- One person-Athletic Field lights
- One person-House 18
- One person-Science D
- One person-Library
- Six people-Founders Hall
- One person- I don't the campus is dark
- One person-Temporary buildings
- Four people-Empty classrooms/labs
- Two people-offices
- Twenty-three people-heating w/ windows open, unused rooms, overheating
- Three people-too cold/air-conditioning
- One person-old buildings
- Forty-nine people-lights left on
- Twenty-two people-computers left on
- One person-venting in library
- There are too many vehicles traveling around campus. Lights and computers are left on in classrooms and offices.
- Lights on when not needed, doors/windows open in heated rooms, computers and monitors left on.
- Green and Gold room lights constantly on. Buildings always overheated.
- Classrooms in Founders Hall aren't on movement sensors and people often leave lights on in empty classrooms.
- Heating a building with windows open. Lights left on. Not recycling.
- Buildings with doors left open. Lots of lights left on.
- Lighting, heating and transportation.
- Over heated buildings, where windows are usually left open, lights left on, etc.
- All over.
- Lighting. My office in Siemens Hall is over lamped. There are eight 48-inch fluorescent bulbs in four flush-mounted fixtures. In the past, I have removed all but two lamps and found the working environment very satisfactory. Unfortunately, every time I do this the lamps are replaced and my office returns to its uncomfortable, energy-sapping state.
- None
- I don't. On the weekends, even the hall lights are turned off. Rooms like bathrooms and others with multiple users have automatic shutoffs. Faculty are encouraged to turn off computers before they go home. Overuse is not a problem on this campus.
- Stadium lights.
- Open windows on cool days and nights. Several large police cars for a small campus area.
- Lights on in bldg's at night, etc. Heat on in bldg's during sunny days.
- Lights, windows open while heat is on.
- I don't see energy being overused on campus.
- Our office light is on 24/7 in the Hist. Dept.
- Rooms too hot! Lights on into the night (empty halls and rooms).
- Lights/computers. Especially when nobody's here.
- Lights left on in unoccupied classrooms.
- Too much constant night lighting (use motion activated). Buildings kept much too warm all day. e.g. thermostats in science lecture halls are set way too high.
- Fume hoods.
- Redwood Stadium.

- Building lights, heating, and computers left on when no one is around or not in use. Excessive ceiling lighting when natural light from windows and small desk top lamps would be more than sufficient.
- Opened windows during winter, like in Founders Hall.
- Heating rooms/hallways.
- Classrooms lights left on and windows open when class is over.
- Athletic field lights burning into the night. Lights on in empty classrooms. Monitors on in empty offices.
- Everywhere. Lights left on, computers left on (comp techs often encourage this in experience, "less wear and tear on the switches").
- Cars and fuel consumption.
- Computers left on, lights left on.
- Interior lighting, maintenance equipment like leafblowers, waste like paper not reused, Founders Hall is too hot or too cold always.
- Uncertain.
- Library (because that is my workplace)
- Lights left on in locked buildings, computers left on in fac. Offices.
- Water heater thermostats
- When I go to my night class in Founders Hall, every classroom is empty, but the lights are on, doors open.
- CRT monitors – labs, offices, all over
- Nowhere
- Library computers, lab computers.
- Everywhere. Buildings often have lots of lights on after hours. Some offices have unnecessary amenities (e.g. fountains, lava lamps, microwaves, etc.).
- I believe more energy is used turning ventilation system off and on in library, then would be by remaining constant.
- Empty rooms with lights on.
- Keeping lights on in buildings that are closed for the night.
- Computers left on, printers, lights, type of light bulbs
- In the library – one can't turn off some of the lights in areas – it's all or nothing.
- Unknown

Question #4: What do you perceive as the problem?

- One person-individual small refrigerators, heaters and fans being used
- Two person-lack of a culture of conservation
- Sixteen people-carelessness
- Four people-limited technical ability to apply energy
- One person-rigid thinking, resistance to change
- Six person- people are too lazy
- Seven people-lack of awareness
- Four people-no problem
- Three person-lack of communication
- Eight people-no plan
- Too many people driving to campus, lack of conservation commitment. We should put solar panels on all buildings.
- People are too lazy/indifferent to turn off lights.
- Awareness. System for control. Bad habits.
- It is nobodys responsibility to correct it.
- "It's not my bill"
- Input from students, staff and faculty – communication.
- I'm not sure it is a "problem" more than a necessary evil. Turning down the lights may turn up lawsuits.
- I suspect we're running lights that were designed-in by a 1960's architect based on standards that don't match today's needs.
- No problem. The university is doing a great job.

- Building air circulation. More cops on foot and bikes.
- Lack of a better conservation plan?
- No central plan or overview of use.
- Bad habits and complacent perspective.
- Many people using the same space. Laziness. Unconsciousness.
- Arnold
- Lack of faculty co-operation.
- Lack of awareness. Also: Windows are not appropriately placed for the best use of sunlight in some buildings. Cold drafts come in the building with constant in-out traffic and some staff/faculty at their desks need to bring in heaters.
- None
- Students open window in hallways and classrooms after walking up the hill too fit, then never close them.
- Open windows.
- Instructors/staff/students being distracted after class, maybe assuming someone else will do it.
- No one thinks about it.
- Old buildings and systems poorly maintained. Plant ops may be well-intentioned, but often inept.
- Lack of parking. A serious conservation issue both on terms of gasoline and human wasted time.
- People not caring.
- Lack of will.
- Lights left on when building is closed; excess heating.
- Adjust thermostats – put them on a timer the way I do at home to save lots of $$$.
- Ignorance.
- CRT monitors
- Still using CRT instead of LCD technology for computer monitors.
- People who don't think about the effects of leaving lights on, computers on, etc. on energy costs.
- Lack of communication between all players
- Lack of awareness
- People not turning off lights when building is closed/locked in the eve.
- Taking time to do what is necessary. (I think)
- Maintaining a very large infrastructure for a large # of people, 24/7 requires a lot of energy use.

Question #6: Do you ever leave lights/computers on? If so, why?

- Thirteen people-only if I leave the room for only a few minutes
- Ten people-takes too long to restart up again
- Three people-I need to access the computer from home or other location
- Eleven people-Safety, told not to turn off the computer as it will hurt it or it costs more money to turn off and on
- One person-too lazy or pressed for time
- Three person-I forget
- One person-lose the internet when I shut down
- Ten people-more efficient to leave computer on
- Yes, more efficient than turning on and off.
- If I'm away from the office for a class, I leave the computer on.
- I don't want to reboot when I return, and it decreases wear and tear on the hard drive.
- Never, if I'm not actively using them.
- I don't usually but my chilly basement office has electric heat only, so it wouldn't matter if I did.
- Lights, if I am not the last person in the office.
- Computer (never over night) just during the day because other use my printer. I leave on lights because others are still in the office working when I leave.
- Yes, leave them on every time roll the chair to work at my regular desk. I leave on the computer but not the lights when I go to class. I turn off both when I go home. The real question, it seems

to me, is whether we can provide information to users to help them assess "best practices" that will balance energy consumption, labor efficiency, and long-run equipment/maintenance costs.

- I leave the computer on during the day and turn it off when I leave for the day. Lights I turn off when I leave the room.
- Computer, it has an energy saver and I leave it on while I'm in class or my office.
- Other users at different times.
- Computer, only on days I'm working on the computer quite a bit.
- Only during the day.
- It is not a normal desktop – used for research.
- Computer, I turn it on when I arrive and off when I leave, since I use it throughout the day.
- Computer, with monitor off – to move files back and forth from home office to school office.
- I don't leave these on, in fact when I leave in the evening, I turn off other left on lights.
- Computer, on-going calculations necessary for my research.
- Computer, takes very little energy, I put on sleep.
- Forgetfulness.
- Computer, I sometimes run models that require several days computational time.
- One computer must be left on to run batch every morning.
- Lights, others are still working when I leave.
- Computer, tasks running while away.
- My work computer takes too long to boot up – I need to start work at once.
- Sometimes need to compress video and burn DVDs that takes many hours to complete.
- Occasionally, I leave the computer on if I am working on a project or am logged into a site that I may have trouble getting into again. I usually shut the computer down when I leave.
- Lights, safety issues.
- I forget
- I certainly do everything I can to turn these off.
- Leave them on during the day, but off when I leave at night.
- When I'm done for the day everything is shut down and turned off.

Question #7: Is your office temperature comfortable?
If not, what problems do you have, and what do you do to compensate?

- Thirty-one people-office too hot, open window, fan
- Forty-six people-office too cold, use floor heaters and layer clothes, exercise, close door
- Three people-thermostat is broken
- My office and classrooms are too cold, use small heater (in office).
- Way too hot on school days. I have to open a window.
- Way too hot. I have sunlight and southern exposure. Air conditioning would be great. Are there any air conditioned rooms on campus?
- Hot and stuffy. I open windows.
- No, because I always turn off the heat when I'm not around and don't heat it much when I'm in.
- Too warm, open window.
- I think room temps generally should be lowered all over campus – we can put on a sweater!
- If it is chilly, I wear a sweater.
- Ask any of the campus technicians involved with controls and I'm sure they will tell you that the biggest problem facing them is the variation in individual preferences and perceptions of "comfort".
- I need to keep the outer office door closed to keep the heat in – Founders Hall.
- Was too hot! 74 degrees. Accessed and lowered temp. setting! 68 degrees.
- Often times too hot due to southern exposure, I compensate with a oscillating fan and opening the window.
- Too warm, open a window. Too cold, turn on an incandescent lamp, wear a sweater.
- Yes, I have no campus enforced heating of my office.

- Poor building engineer support: on some specific buildings. Mechanical problems with building operation. Yell louder.
- Fruitless.
- During our warm/sunny season, it gets too hot and I need a fan to stay awake. I open-close blinds and my window a few times during the day.
- Exercise if cold and bring layers. Open window/remove layers if hot.
- It's too cold – I wear extra clothes.
- Wear a jacket or layer more than usual, which is bulky and makes doing my work more cumbersome.
- I wear sweaters.
- It's freezing. I have to run a space heater almost all the time. Many others in the building have to do the same.
- If it's unbearable I call to have it turned up, otherwise, I wear a jacket.
- I wear a sweater and or jacket. Sometimes I could use gloves but I can't work that way!
- Use a space heater.
- It's freezing! But the alternative was to roast – thermostat wouldn't be fixed. I bought an expensive low energy passive heater for my office. I use only when I am there.
- Often to hot or cold; computers help to heat the office.
- Usually comfortable, but sometimes quite cold, so I wear a sweater.
- Open window by desk
- Warmer then I need
- Library ventilation system either over blows cold air of hardly blows extreme heat.
- Usually cold – use heater.
- I wear layers and bring hot and cold beverages.
- In winter when it gets really cold at night, it takes a while to get offices heated up – use a space heater then.
- One thing I do not do is change thermostat
- Wear appropriate clothing
- There has been times when temp has gone below 65 degrees because the HVAC is off because of projects going on or repair and have used a portable heater then.

Question #8: Any suggestions or observations about energy use on campus?

- Nine people-make awareness with mailings, e-mails, etc.
- Two people-insulated curtains
- Eight people-install solar panels, alternative energy
- One person-retrofit buildings
- Three people-fix thermostats
- Sixteen people-education of students, faculty, and staff
- Nine-use more motion sensitive lights and more energy efficient light bulbs
- One person-discourage use of space heaters
- Eight people-educate students and staff
- One person-pedal power
- One person-PG&E audit
- Seven people-sensors to turn off lights
- Turning lights off would help a ton.
- Movement sensors in bathrooms and classrooms to turn the lights on.
- Send out a "Conservation Checklist" in the weekly announcements. If everyone sees the list each week, perhaps habits will improve. On the list tell us what to do.
- None
- Charge each unit for energy use and they will arrange to conserve.
- Most rooms with windows don't need lights on. Individual offices in Founders cannot control temp except with window – who's stupid planning was that?
- It seems many of the most cost effective solutions are already being practiced.

- Energy use, like other important resource issues is a process that can be managed with the goal of improvement. That requires measurement and reporting. You can't manage what you can't measure. Measure what matters. Create a culture of commitment to improvement. We can all do better.
- This campus takes great pains to make sure that lights are turned off and that the heat is set at a reasonable level. I think that it would be challenging for the University to conserve more than it already does.
- Automobiles are over used. Public transportation needs to be developed.
- What needs addressing is the campus police who still are driving enormous Ford Crown Vics with big V-8 engines around our teeny little campus.
- Make all faculty/staff aware of monthly electric/gas bills. Encourage profs to turn off lights if natural light is available.
- More auto shut-offs for lights. Lower thermostats to 68 or 70 degrees F. Educate offices about computer equipment shut off. Sleep mode for computers in labs! At night most are unused.
- I wonder to what extent there is a long-term commitment to energy efficiency, or to what extent it is a response to student pressure, and when students leave, things revert.
- Make University totally self-sufficient in as close to meet as technologically possible. Let the coaches and the guys sitting on the bench peddle bicycles to keep the lights burning.
- Raise awareness re: opening windows while heating building.
- Motion lights in classrooms (maybe even offices).
- Turn off the lights of the Redwood bowl!
- I spend more time and gas finding parking than driving from my home to campus.
- Fix heating in Founders. Get rid of paper waste.
- Need more solar panels on top of buildings!
- Saving/min. use is best way to help.
- Attitude/Education are key. We care about this as individuals, so we each try to do what is best to conserve energy.
- No one knows whose responsibility it is. Most Americans are not energy conscious.
- Ask PG&E to do an energy audit. Confer with other CSU and campuses to exchange ideas for saving energy use.
- Figure out a way to make everyone aware of not only the cost of wasted energy, but of the fact that these are limited resources on our planet! We are all responsible.
- Too little concern at individual level.
- An environmentally friendly/conscious campus such as HSU really should be using solar energy and other alternative energy sources. Aren't there grants that campus could get? It would be a perfect project for engineering students to take on.
- More awareness
- I wish we could use more solar energy on campus.
- More energy efficient computers, light bulbs and so on, but they cost $!
- Just keep trying and lead by example!
- More alternative energy resources such as solar or whatever might be feasible in this area.
- Install solar panels on all buildings, replace any incandescent fixtures.

Students Survey - Quantitative Results

Student Survey Quantitative Results			
Question	Total Surveys	150	%
#1: Where do you live?			
	On Campus	29	19
	Off Campus	121	81
#2: Do you feel energy is being overused on campus?			
	Yes	100	67
	No	39	26
	No comment	11	7
#3: Where are you more aware of energy conservation?			
	On Campus	6	4
	At Home	91	61
	Both	42	28
	Neither	9	6
	No comment	2	1
#6: Who should be responsible for overseeing the conservation of energy on campus?			
	Total Comments	319	
	U. Admin	122	38
	Faculty	85	27
	Students	101	32
	Other	8	3
	No comment	3	1
#7a: Do you ever notice lights left on after the students have left for the day?			
	Yes	113	75
	No	34	23
	No comment	3	2
#7b: If so do you turn them off?			
	Yes	90	60
	No	36	24
	Sometimes	17	11
	No comment	7	5
#8: Are your classrooms or other gathering place's temperatures comfortable?			
	Yes	105	70
	No	36	24
	Sometimes	9	6

Student Survey- Qualitative Results

Question #3: Where are you more aware of energy conservation? Why?

- Seven people-at home as I pay the bill
- Three people-neither, as I live on campus
- Ten people-I am in control
- One person-both, natural lighting
- One person-both are my homes
- One person-at home as my boyfriend is an environmental engineer

Question #4: Where on campus do you see energy being most overused?

- Ten people-I don't
- Forty-nine people-lights
- Twenty-six people-computer labs
- Twelve people-classrooms
- Three people-bathrooms
- Twenty-one people-dorms
- Five people-sports areas
- Five people-heating and cooling

Question #5: What do you perceive as the problem?

- Three people-open windows
- Nine people-technology
- Sixteen people-lack of knowledge
- Twelve people-unaware of ecology

Question #8: Are your classrooms or other gathering places temperatures comfortable?
If not, what problems do you have, and what do you do to compensate?

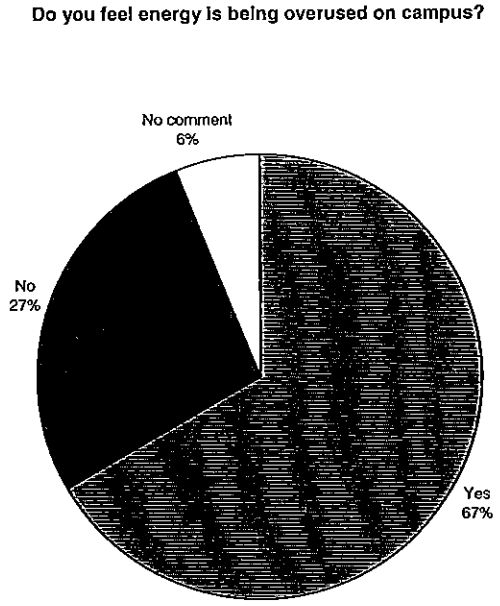
- Six people-too hot, get fresh air, complain, layer, open door or sweat it out.
- Eleven people- too cold, layer clothes, open doors to let in warmer air

Question #9: Any suggestions or observations about energy use on campus?

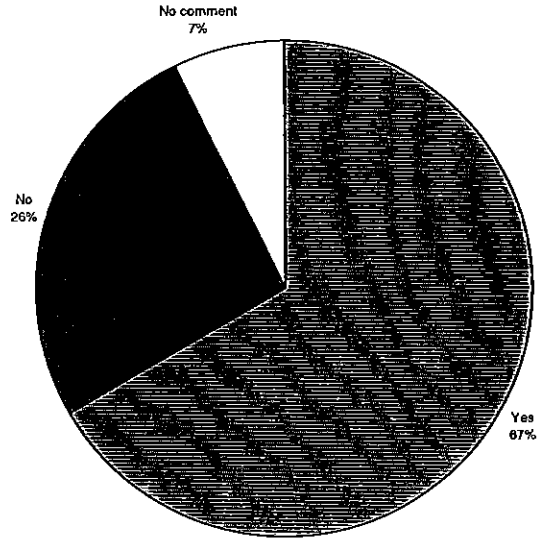
- Seven people-alternative energy, solar, wind and use CCAT knowledge
- Eight people-education, awareness campaign
- Five people-motion lights and energy efficient light bulbs
- One person-energy audit by PG&E
- One person-design more energy efficient buildings

Survey Results - Graphics

Staff/Faculty Survey Question #1:

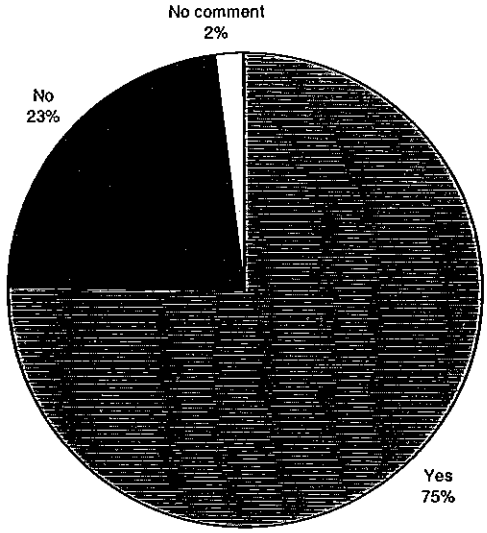


Student Survey Question #2:



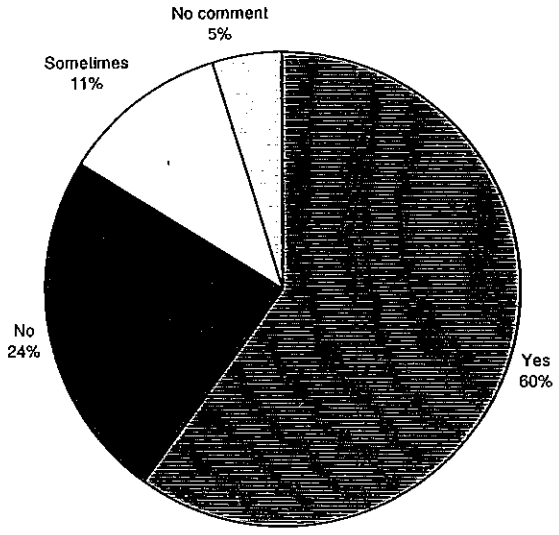
Student Survey Question #7a:

Do you ever notice lights left on after the students have left for the day?



Student Survey Question #7b:

If so do you turn them off?



Follow-up Surveys

Energy Conservation Follow-Up Survey

(Staff/Faculty)

This survey is being administered by volunteers working with the Energy Conservation Outreach (ECO) Plan to gain annual input from the campus community. The ECO Plan has been put together by HSU students to help Schatz Energy Research Center and the campus community. The responses to this survey will remain anonymous, and will serve solely as a basis for our energy study.

1) Do you feel energy is being overused on campus?
   □ Yes □ No

2) If you were here last year, please note any changes you notice in campus energy use.

3) Where on campus do you see energy being most overused?

4) What do you perceive as the problem (relating to question above)?

5) Who should be responsible for overseeing the conservation of energy on campus?
   □ University Administration □ Plant Operations
   □ Within departments □ Individuals
   □ Other (Please state)

6) Do you ever leave on:
   □ Computer □ Lights
   If so why?

7) Is your office temperature comfortable?

   If not, what problems do you have, and what do you do to compensate?

8) Have you noticed any efforts to increase energy awareness on campus?

Energy Conservation Follow-Up Survey

(Student)

This survey is being administered by volunteers working with the Energy Conservation Outreach (ECO) Plan to gain annual input from the campus community. The ECO Plan has been put together by HSU students to help Schatz Energy Research Center and the campus community. The responses to this survey will remain anonymous, and will serve solely as a basis for our energy study.

1) Where do you live?
   □ On Campus □ Off Campus

2) Do you feel energy is being overused on campus?
   □ Yes □ No

If you were here last year, please note any changes you notice in campus energy use.

3) Where on campus do you see energy being most overused?

4) What do you perceive as the problem (relating to question above)?

5) Who should be responsible for overseeing the conservation of energy on Campus?
   □ University Administration □ Faculty □ Students
   □ Other (Please state)

6) Do you ever notice lights left on after the students have left for the day?
   □ Yes □ No

   If so do you turn them off?
   □ Yes □ No

7) Are your classrooms or other gathering place's temperatures comfortable?
   □ Yes □ No
   If not, what problems do you have, and what do you do to compensate?

8) Have you noticed any efforts to increase energy awareness on campus?

Implementation

GIS Letter

Jessica Barr
HSU Energy Conservation Outreach Plan
Environmental Science Practicum, ENVS 410
Schatz Energy Research Center

Professor Steve Steinberg
NRPI – Geographic Information Systems
Humboldt State University

Professor Steinberg,

I am a group member working on the HSU Energy Conservation Outreach Plan and am writing in regards to the potential of a future project for one of your students in fall 2004. The project would be supported by Schatz Energy Research Center for the benefit of our HSU Energy Conservation Outreach Plan.

The project is to create a map of the HSU campus with structural and energy data. The data that we would like to include in this project includes the following:

- buildings area (square foot)
- buildings energy loads from energy audits
- which buildings are on which gas and electric meters
- buildings color-coded for energy use intensity (low-green, moderate-yellow, high-red) by BTU per square foot per year
- structural and technical history and facts for each building, such as year built, total BTU/yr., BTU/sq. ft./yr., electric and gas costs per year, and % change (up or down) in energy use compared to previous year.
- future electricity generation from solar arrays on specific buildings

It is felt that even though we don't yet have much of the data we need to put into such maps, it would be great if we could coordinate creating the maps, with a plan to have future students or Schatz lab interns collect the data and fill in the blanks.

Please contact Richard Engel at Schatz Energy Research Center with any questions or comments for this project idea.

Thank you for your time and energy.
Sincerely,

Jessica Barr
Task Force 11, group member
HSU Environmental Science major

KRFH Public Service Announcement

Hello, students of Humboldt State. Do you ever think about how much energy we use on campus? No, I don't mean the effort it takes you to walk up all those hills and stairs. I'm talking about the energy being burned by lights and computers, as well as the energy that heats our classrooms and our water.

If you look around, you might notice lights on in empty classrooms or computers on late in the day, when no one will be using them. We can all take the initiative to turn these energy-wasters off. It's a small good deed that can really make a difference.

This message is brought to you by the Energy Conservation Outreach Plan for Humboldt State.

Team Members Hours and Cost

	Hours
Group Meeting	13.2
Jessica Solo	36.5
Emily Solo	20
Elizabeth Solo	40
Elise Solo	35
Jessica Survey	2
Elizabeth Survey	4
Elise Survey	1
Total	151.7

Person	Item	Cost
Emily	Art Supplies and Copying	$2.00
Jessica	Paper and Candy	$10.00
Elizabeth	Candy and Copying	$20.00
Elise	Copying	$26.00

Glossary of Terms

BTU:

"The British Thermal Unit (BTU) is a precise measure of energy. It is the amount of energy required to raise the temperature of 1 pound of water 1 degree Fahrenheit when the water is near 39.2 degrees Fahrenheit."[3]

Campus member:

Any student, faculty member, or staff member at HSU

CSU:

California State University system

ECO:

Energy Conservation Outreach Plan (this document, and all the actions detailed).

Footprint:

Ecological footprint, the natural resource consumption accounted for by any particularentity, such as an individual, a nation, or a university.

HSU:

Humboldt State University.

kW:

"kiloWatt: a unit of power equal to 1000 joules per second."[2]

kWh:

"The kilowatt-hour (symbolized kWh) is a unit of **energy** equivalent to one kilowatt (1 kW) of **power** expended for one hour (1 h) of **time**. The kilowatt-hour is not a standard unit in any formal system, but it is commonly used in electrical applications."[1]

Schatz Energy Research Center:

A Northern California establishment "working to establish clean and renewable energy technologies in our society."[6]

Tragedy of the Commons:

Term coined in a 1968 *Science* article by Garrett Harden.[4] "Commons" refers to any resource shared by a group. The tragedy stems from the fact that everyone wants optimal usage of the resource, and no one takes responsibility for its preservation.[5]

1. Whatis.com, **http://whatis.techtarget.com/definition/0,,sid9_gci797759,00.html**.
2. Powergrid Fitness, **http://www.powergridfitness.com/kilowatt.html#what_is**.
3. Energy Information Administration, http://www.eia.doe.gov/kids/btudef.html.
4. "The Tragedy of the Commons," Garrett Hardin, *Science*, 162(1968):1243-1248.
5. http://members.aol.com/trajcom/private/commons.htm.
6. Schatz Energy Research Center, http://www.humboldt.edu/~serc/about.html.