



BLUEPRINT FOR A GREEN FUTURE

University of California, Davis
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Prepared by Vice Chancellor Stan Nosek's
Sustainability Advisory Committee
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UC Davis Sustainability Advisory Committee:

BLUEPRINT FOR A GREEN FUTURE

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UC Davis Sustainability Advisory Committee:

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Sustainability Definition and Guiding Principles

Adopted July 2005

What is Sustainability?

Sustainable practices support ecological, human, social and economic vitality for both our campus and the global community. Sustainable actions meet present needs while enhancing the environment and the ability of future generations to thrive.

Sustainability Principles and Values

- **Employ a holistic approach**

- Address short- and long-term benefits, costs and impacts
- Integrate environmental, economic and human considerations
- Link teaching, research and public service with campus planning, development, policy and operations

- **Strive for progress**

- Identify metrics or other tools that gauge participation, awareness and action
- Evaluate in an iterative, adaptive and responsive manner
- Adjust goals and indicators as new insights are gained
- Employ continuous improvement
- Seek and apply knowledge from others

- **Promote sustainability as a shared responsibility**

- Engage faculty, staff, students and visitors
- Conduct open and accessible communication
- Enhance interdisciplinary teaching and research
- Improve coordination and relationships throughout the campus community

UC Davis Sustainability Advisory Committee:

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Executive Summary

The publication of “Blueprint for a Green Future” marks the opening chapter, and not the epilogue, of what should be a lively discussion of sustainability at the University of California, Davis. To be a sustainable campus, to act in a sustainable manner, means to turn words into deeds, to make decisions and take actions based on what would be in the best long-term interest of this campus as a whole. But those long-term interests are a moving target, so any guide or blueprint for hitting those targets must clearly be a living, breathing organism, subject to revisions as the situation warrants and requires.

Computer scientist Alan Kay has been quoted as saying, “The best way to predict the future is to invent it.” This first report of the UC Davis Sustainability Advisory Committee, then, is the committee’s recommendations and action plan for “inventing” UC Davis’ future, a future that manages and allocates resources in a sustainable fashion. That means meeting the campus’s present needs while enhancing its environment, all the time keeping a watchful eye on how today’s decisions and actions impact tomorrow’s generations.

The 21-member UC Davis Sustainability Advisory Committee, under the direction of Chair Jill Blackwelder, has assembled a list of its top 15 high-priority recommendations for immediate action, recommendations that will cost an estimated \$980,000 to implement, along with estimated ongoing annual operations and maintenance costs. The recommendations are grouped into five categories: Campus planning and transportation; education and outreach; energy and atmosphere; “green” buildings; and material management. To be sure, these 15 recommendations are not the committee’s only calls to action. In fact, there are many more recommendations to be found throughout the report and in its appendices. But the committee felt it was important to launch this campus sustainability effort with reasonable, obtainable goals.

Perhaps as important, the committee’s hope is that this report will spark discussion and debate about the importance and application of sustainability throughout the campus -- in lecture halls and laboratories, and not limited to meeting rooms and dining halls. Indeed, many of the recommendations employ a strong link to the academic community through administrative-academic partnerships. To that end, the Sustainability Advisory Committee’s recommendations reflect the multidisciplinary approach that is the hallmark of UC Davis, marking a unique and compelling difference between its call to action and the recommendations of many similar administrative committees.

The consensus is that UC Davis is already on the right path toward sustainability. Consider the innovative, sustainable food service techniques at Segundo Dining Hall, the UC Davis 100 Year Tree Plan and the recent efforts to transform the campus’s messy olive trees from a waste product to a marketable product – gourmet olive oil. But for sustainability to truly become woven into this campus’s fabric over the long run, our entire campus community must wrap its arms around the project of making our campus more sustainable through interactive opportunities. Participating actively can foster an increased sense of personal stewardship of the campus, and can help people learn more about the complex systems relationships that characterize sustainability.

This report is likely to raise more questions than it offers answers. For example, UC Davis has no campuswide coordinator of sustainability, no dedicated staff. Should it? Again, this report is intended to spark the debate, not end the discussion.

For our campus to adopt and embrace this report’s top recommendations would be an important first step toward elevating sustainability to the level of our campus’s respected Principles of Community, in effect treating the environment in which we live and work with the same degree of respect that we regard our community members.

UC Davis Sustainability Advisory Committee:

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Top Recommendations

Campus Planning and Transportation:

- 1) Lay the framework for implementing sustainable transportation, including a study of alternative transportation and the marketing of a walk/bike plan, all efforts aimed at gaining control of an increasing number of single-occupancy vehicle (SOV) commuter trips to and from the campus, and decreasing the campus fleet's reliance on carbon-fueled vehicles.
- 2) "Green" our water management systems. Faced with increasing legislative and regulatory pressures, the campus should work toward improving water quality and reducing peak volumes of discharged storm water, and minimizing impacts on regional ecology associated with campus water use. The campus should prepare a storm water pollution reduction plan and study the use of reclaimed water.
- 3) Engage our campus community about sustainability. The goal is to support an interactive environment, not just push information to passive recipients. To reach that goal, the campus should create a "green map," increase explanatory landscape signage and re-establish the Horticulture voluntary campus horticulture crew.

Education and Outreach:

- 4) Produce an educational/informational documentary that highlights key ways that UC Davis "walks the walk" in its commitment to sustainability, highlighting people, projects and buildings. The video could be "posted" on the campus Web site, aired on the local PBS affiliate, KVIE-TV, as well as UCTV's "State of Minds" public affairs program, and shown on campus TV and on monitors at UC Davis booths at various sustainability trade shows and events.
- 5) Develop a campus sustainability Web site that would, among other things, promote UC's and UC Davis' sustainability mission, vision and values. In addition, it would provide links to other sustainability sites, make it easier for departments to buy sustainable products, promote the R4 recycling program and provide other waste recycling and disposal information.
- 6) Launch a research grant competition for promising student-researchers interested in sustainability. Publicize the launch of the competition as well as the subsequent research projects undertaken and their results in campus publications, including *Dateline UC Davis* and *UC Davis Magazine*, and promote it all to outside news media coverage, including "green" publications.
- 7) Incorporate sustainability messages into student orientation materials (both for undergraduate and graduate students) as well as into new staff and faculty orientation programs and materials. Specifically, include the UC Davis Sustainability Definition and Guiding Principles in all such materials.

Energy and Atmosphere:

- 8) Complete the installation of utility meters and implement an audit program to determine individual buildings' energy demands and map out overall campus energy use and effective overall management of campus energy supplies.
- 9) Immediately procure -- subject to budget availability -- 10% of campus electricity from "green-certified" renewable sources and increase that percentage by 1% per year until a total of 20% is purchased from renewable sources by 2017, consistent with UC Clean Energy and Green Building policy goals.
- 10) Hire a building maintenance energy engineer, expand and integrate building energy management systems, and implement commissioning processes for campus buildings based on audit information gathered, with a goal to reduce overall campus growth-adjusted energy demand by 10% by 2014, and more thereafter as opportunities are identified and funding becomes available, consistent with UC Clean Energy and Green Building policy goals.

"Green" Buildings:

- 11) Re-commission, or retrofit and fine-tune, utilities and equipment in existing buildings at a pace equivalent in area to the amount of new construction area added each year. This assumes an average re-commissioning of 200,000-300,000 gross square feet annually.

- 12) Develop a plan for financing a more comprehensive building renewal program to supplement the Deferred Maintenance Program. The plan would include the hiring of an intern, the allocation of staff support to develop the Building Assessment Program into an ongoing planning tool and research into policy and funding options such as Seismic Safety funding and other plans for ongoing building renewal.
- 13) Perform post-occupancy evaluations on all new and re-commissioned buildings to determine how well buildings and their design features actually function. This would require the hiring of two student interns to train and coordinate student evaluators, a commitment by Environmental Design students to perform the evaluations and a project manager.

Material Management:

- 14) Establish a campuswide waste prevention and recycling program, in coordination with the campus's R4 Program.
- 15) Increase sustainable practices in the campus's food services, in cooperation with Sodexo, the Coffeehouse and outside catering services. To this end, employ a graduate student researcher to survey students about their attitudes and demand for organic and local food on campus, and to research what other colleges are doing.

**Sustainability Committee "Top 15" Priority Recommendations
January 2006**

		New initiative requiring campus commitment		Initiative already proposed: needs campus commitment		Resources Required					
Campus planning and transportation	1	Framework for sustainable trans.		Academic Partnership	Existing Staff	Existing Funds	New Staff	New or Reallocated Fund Source	New Funds		
		New initiative requiring campus commitment	Initiative already proposed: needs campus commitment						One time	Annual	
Campus planning and transportation		Comprehensive circulation plan			•			Undetermined	\$180,000		
		Initiate "missing teeth" project			•			Undetermined	TBD	TBD	
		Market walk / bike plan			•			Undetermined	\$25,000		
		Finalize alternative transportation study			•	•		Undetermined	TBD	TBD	
	2		"Green" water systems	"Green" water systems							
			Stormwater pollution reduction plan			•			Undetermined	\$50,000	
			Study reclaimed water use			•			Undetermined	\$50,000	
	3		Engage campus	Modernize irrigation system		•			O&M / Other	\$600,000	
			Create campus green map			•			OOA	\$4,000	\$1,500
			Landscape signage			•			Undetermined		\$50,000
			Horticulture volunteer crew			•		•	Undetermined		\$50,000
	Education and Outreach	4	Produce educ./info documentary			•			OOA	\$10,000	
		5	Build campus sustainability Web site			•			OOA	\$10,000	\$1,500
		6	Sponsor student-researcher grants			•			OOA	\$10,000	\$10,000
	Energy and Atmosphere	7	Revise orientation materials			•	•				
8		Install utility meters	Install utility meters								
			For recharge customers		•						
9		Procure 10% green power			•			Purch Util	TBD		
Green Buildings	10		Hire building maint. engineer		•	•		O&M		TBD	
			Implement energy audit program		•	•		O&M			
Material Management	11	Continuous re-commissioning			•			Purch Util	\$1,000,000		
	12	Building renewal program			•			OOA	\$10,000	\$10,000	
	13	Post-occupancy evaluations			•			O&M/CAP	\$21,000	\$17,000	
	14	Establish recycling policy			•						
	15	Sustainable food practices			•			OOA	\$10,000		
						TOTAL		OOA	\$54,000	\$23,000	
								O&M / Other	\$600,000	TBD	
								O&M / CAP	\$21,000	\$17,000	
								Undetermined	\$305,000	\$100,000	
								Purch Util	TBD	\$1,000,000	

UC Davis Sustainability Advisory Committee:

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How to read this document:

The full report provides chapters on five campus functions or subjects, as reported by the subcommittees:

- Campus Planning and Transportation
- Education and Outreach
- Energy and Atmosphere
- Green Buildings
- Material Management

Each of the report's five chapters, in turn, is divided into seven sections:

1. A brief description of the function or subject matter, as it pertains to sustainability
2. How UC Davis approaches that function or subject matter in a sustainable fashion
3. An outline of the matrix of options at UC Davis for each sustainable function or subject
4. A list of efforts to date (what have we accomplished, what have we measured, how are we doing?)
5. Recommendations for action
6. Pushing the bounds (a significant, challenging long-term goal)
7. Sources of innovation (who can UC Davis turn to for new and provocative ideas and approaches?)

CAMPUS PLANNING AND TRANSPORTATION SUBCOMMITTEE REPORT

*A society grows great when old men plant trees whose shade
they know they shall never sit in.*

– Greek Proverb

1. What is sustainable campus planning?

In general, campus planning is how a higher education institution plans, allocates and manages campus resources and guides the physical development of the campus in such a way as to help the institution fulfill its mission of teaching, research and service (often stated at UC Davis as learning, discovery and engagement). To make the idea of sustainability more explicit in campus planning, this section defines and outlines principles for what would constitute sustainable campus planning.

The Six Principles of a Sustainable Campus:

1. Acknowledge and build upon our heritage and unique qualities (climate, soils, topography, etc.).
2. Practice good stewardship of our diverse campus resources.
3. Plan, build, and maintain an integrated, “green” infrastructure.
4. Expand our use of our campus as a learning environment for sustainability (the intentional campus).
5. Constantly work toward connecting campus planning and design decisions with operations and maintenance.
6. Encourage ongoing, active participation of our community members in the care of our campus.

At UC Davis, campus planning is currently guided by the 2003 Long Range Development Plan, which lays out a set of principles and policies to structure our growth and development through the academic year 2015-16. These LRDP principles and policies are campus commitments, and a way to ensure we bring our goals to fruition. The LRDP and its Environmental Impact Report, which analyzed the potential environmental impacts of implementing the LRDP, act as tandem planning manuals to inform various campus activities and standards, such as the Campus Design Standards.

2. Sustainable campus planning for UC Davis

Sustainability implies making decisions based on what would be in the best long-term interest of the institution as a whole (Pearce and Uhl, 2003). To become a sustainable institution, we need to infuse our campus, at every level, with agreed-upon and adopted sustainability principles that evolve from our Principles of Community, and then add to them. Extending our Principles of Community’s philosophy of mutual respect to a philosophy of creating a healthy, thriving environment now and for future generations – both locally and globally – will help our campus community adopt sustainability as an abiding commitment that requires our ongoing attention and underlies our basic actions and decisions.

Effective sustainability is contextual, so to make wise choices to guide our institution, we need to understand what makes our campus unique, and what common issues we share with other campuses. Davis has a relatively mild, Mediterranean climate, and though summer days can be very hot, most summer evenings the “Delta Breeze” blows from the southwest, bringing cool Pacific air to the region across the Sacramento Delta and cooling down ambient temperatures considerably. Our topography is flat, and our regional soils tend to be clayey, so we frequently experience sheet flow after soils are saturated during heavy winter rains. Our region has large aquifers that provide groundwater for both our drinking and irrigation water. Putah Creek runs to the south of the campus, and that southern branch is a human artifact of the 1880s, when local farmers decided to relocate the northern fork, which ran through what are now UC Davis campus lands. We currently utilize the northern fork remnant (the Arboretum Waterway) as part of our stormwater management system.

UC Davis originated as an agricultural campus and in large part remains so today. Our region has been and continues to be an important source of agricultural products, especially renowned for stone fruits and nuts due to the climate and soils. At 5,300 acres, we are the largest campus in the UC system. We have the greatest number of professional schools among the UCs, including the only veterinary school in the UC system. We have a dairy on campus, as well as other animal facilities. We have a rich campus landscape, with many mature trees, some of which are native oaks and sycamores. Parts of our campus look out upon the foothills of the Vaca Mountains in the Coast Range System. We historically have

had a very large number of our campus community members commute to, from, and on campus by bicycle. We have had a close relationship with the city of Davis, having both grown together, and our campus community has been very active in the city community, participating in governance and many volunteer activities. This is our heritage to cherish and honor, and to continue to build upon and extend from, as the campus has done throughout its existence. UC Davis is unusual in the UC system in having so many of its own infrastructure systems. This is an artifact of the campus growing as fast as or faster than the surrounding town during the beginning half-century of the institution. While having so much of our own infrastructure adds flexibility and considerable value, we also must use more of our capital financing on infrastructure than other campuses. We are challenged to find ways to maintain and improve our infrastructure, and to find opportunities to make our infrastructure friendlier to the environment and to our capital and operating budgets while still serving a richly varied set of needs for a major research institution.

Looking forward, as a major research institution, we are 14th in the nation in research funding; consequently we have many laboratory facilities, and are planning more. We had about 28,000 students on campus in 2005, and we plan to increase total on-campus enrollment to approximately 30,000-plus students by the 2015-16 academic year to meet the enrollment targets set by the UC Board of Regents. We have entered Division I athletics, and we are increasing our facilities to participate in this higher level of collegiate sports. We are seeing increased commuting by car as housing prices in Davis have escalated over the past decade, preventing many university faculty, staff and students from living in the Davis community, and thus decreasing proximity to the campus. And, like our sister UCs, we face increased pressure on our financing mechanisms for capital projects and for operations.

Four Big Ideas (based on the Six Principles of Sustainable Campus Planning at UC Davis)

The Campus Planning and Transportation Subcommittee considered several areas of concern and focused on what we could improve. We developed these areas into four “big ideas,” as listed below and developed further in a matrix. For each of the ideas, we explain why the campus would benefit from pursuing the idea, and what we would get for our resource input.

A. Promote a “human powered” campus

WHAT IS THIS?

The idea of a human-powered campus is to encourage people to get to and from campus without fueled vehicles, and to encourage people to get around on campus and get their work done with minimal vehicular use by making the campus and its connections to the surrounding community more walkable and more bikeable. By providing funding and infrastructure to make these choices safer and more attractive, while simultaneously encouraging and improving other transportation alternatives for those who live beyond walking and biking distance, we can create a more conducive environment to choose transportation alternatives to a single-occupant vehicle.

WHY DO THIS?

We improve air quality, one of our region’s gravest environmental and health problems, reduce the costs of parking infrastructure, help campus members achieve health and wellness to some degree, reduce fuel use through reducing vehicle miles traveled, and promote equitable means for getting people to, from, and around campus.

B. Know ourselves and have fun doing so (learning, discovery, engagement)

WHAT IS THIS?

As a university, our mission is learning, discovery and engagement. By studying ourselves as a campus, we have a ready-made laboratory (an “intentional campus”) for our students and faculty, and we can teach ourselves how to investigate the places where we work and live. Our investigations help reveal to us the intricacies of our place and help us be more connected to our campus and increase our care for it. Universities are typically long-lived institutions, and as such, they depend upon continuity and stewardship by those that participate in them. By actively participating in caring for our campus, as well as extending our participatory activities to our region, we become involved and invested in the well-being of our campus as a place and a community of people, a community that has global connections.

WHY DO THIS?

We extend practical research and learning opportunities for our faculty and students. By engaging our diverse campus members and visitors, we build our community, and no institution can be sustainable without a community to support it. We set a baseline from which to measure our progress in becoming a more sustainable institution and create a structure for continually assessing our performance. We also get to have fun while learning and promote what we are already doing to make our campus a wise, nurturing and sustaining place.

C. Craft a regenerative landscape

WHAT IS THIS?

Regeneration implies moving from a “linear system of throughput flows” to a system with “cyclical flows at sources, consumption centers, and sinks” (Lyle 1994). With this perspective in mind, a regenerative campus landscape is healthy, beautiful, connected to our natural ecosystem, integrated with our infrastructure, and teaches campus members about different landscapes and engages our campus community.

WHY DO THIS?

Campus grounds are vital to the experience of students, faculty, staff and campus visitors in creating a pleasing, rejuvenating environment. For alumni and emeriti, memories of the campus landscape and favorite trees, special lounging spots and recreational fields all conjure a part of what they cherished about their time with our institution. By employing our campus grounds to provide valuable services for us, like carbon sequestration, slowing stormwater runoff, and lowering the temperature on campus, we save money on other infrastructure expenses while creating a major part of the campus experience. Our campus landscape is already working in these ways for us to varying degrees, and we have opportunities to really enhance our landscape, our infrastructure, and our campus overall.

D. Plan, build and maintain an integrated, “green” infrastructure

WHAT IS THIS?

Unlike other UC campuses, UC Davis owns and maintains most of its own infrastructure systems, as detailed above. Because of this, we spend more of our capital funding on infrastructure construction and maintenance than other campuses. It behooves us to find ways to reduce the financial and environmental costs of our infrastructure. “Green” infrastructure systems are those that are built from an integrated perspective, strive towards regenerative principles and minimize maintenance inputs.

WHY DO THIS?

We anticipate and avoid regulatory concerns by minimizing or removing the impacts of our systems, we free up capital for other projects or needs to fulfill our institutional mission and we create a learning laboratory for our campus citizens.

3. Table of goals with objectives and implementation actions

								Plan, build and maintain an integrated, “green” infrastructure
			Know ourselves and have fun doing so (learning, discovery, engagement)	C.	Craft a regenerative landscape	D.		
Sustainable campus planning goal: Objective/Implementation action	Promote a “human-powered” campus:	B.						
A.1	A) Walkable campus – create a safe, attractive, convenient walkway system	B.1	Create a campus green map of sustainability oriented aspects of our campus. Use the resulting map to discuss and promote our existing and on-going efforts towards a “green” campus, and identify opportunities for improvement.	C.1	Establish principles of operation for a regenerative landscape, which would include financial soundness, protection of health and safety and risk management, specification of appropriate, long-lasting species in most cases, & use of native and/or drought tolerant species, except in special cases.	D.1	As part of moving towards a life-cycle costing model, explore whether it is possible to connect capital and operations budgets for major building projects. Study how the budget mechanisms interrelate and what connective opportunities can be facilitated. As part of such connectivity, consider operations costs for utilities in the utility study when siting new buildings, as well as connection costs.	
A.1.a	Design a comprehensive circulation plan, to include walkways, bike paths, and roads, and site new buildings with entrances on major walkways	B.2	Assess our systems and operations, set benchmarks	C.2	Expand campus Heritage/ Specimen Trees by planting new, slow-growing, long-lived trees every year to replenish aging hardwoods	D.2	Study utility usage accountability: research and understand the implications of charging all users for all utility services (“Pay as we go for our use”). Formulate a set of recommendations arising from that study.	
A.1.b	Improve pathways for pedestrians, remove unnecessary pathways and delineate pedestrian zones clearly with unique paving pattern or signage							

	Sustainable campus planning goal: Objective/Implementation action								
A.	Promote a “human-powered” campus:	B.	Know ourselves and have fun doing so (learning, discovery, engagement)	C.	Craft a regenerative landscape	D.	Plan, build and maintain an integrated, “green” infrastructure		
A.1.c	Separate pedestrians from bicycles and vehicles, and establish policies and provide enforcement to prevent vehicles from driving on sidewalks and other pedestrian surfaces	B.3	Extend Arboretum further into campus, use even more for teaching	C.3	Develop new demonstration gardens around buildings, including opportunities to use or showcase edible landscaping and native plant species.	D.3	Prepare surface drainage implementation plan and comprehensive stormwater management plan, to include measures such as localized on-site water detention, and possibly retention.		
A.1.d	Provide pedestrian pleasures and surprises such as additional shaded resting areas, educational signage, and pleasing plantings or edible landscaping to encourage walking	B.4	Expand Putah Creek Reserve and Russell Ranch Wildlife Area educational opportunities	C.4	Remove lawns, where sensible, and replace with native and/or drought tolerant plants or with stormwater management mechanisms such as swales to reduce irrigation, mowing, and campus green waste, and to increase habitats that encourage native species to flourish in conjunction with campus operations. Develop a plan of lawns to replace and then target a 5% reduction per year of the identified areas.	D.4	Practice Low impact development (EPA stormwater management policies); incorporate relevant aspects of low impact development into our Division I construction contract specifications, Campus Design Standards and Architectural Design Guidelines, as necessary.		
A.1.e	Create education/marketing program explaining benefits and pleasures of walking	B.5	Teach our infrastructure – for example: daylight some sections of stormwater system, post campus signage explaining our current watershed and historic watershed, prepare a booklet on “how your campus works” for new students, faculty, and staff to orient them	C.5	Continue to support habitat restoration and agricultural land protection through the Putah Creek Riparian Reserve, the Russell Ranch Wildlife Area, and the McConeghy ag preservation parcel.	D.5	Investigate what permeable paving options would work with our soils and climate. Implement a demonstration project on campus. Depending upon results, replace existing paved areas with permeable surfacing, where feasible.		

	Sustainable campus planning goal: Objective/Implementation action	A.	B.	C.	D.	Plan, build and maintain an integrated, "green" infrastructure
A.1.f	Avoid one-story buildings (LRDP specifies a four-story average) to facilitate a compact central campus that can be crossed on foot during a 20 minute walk	B.6	Compete for water and waste reduction in dorms; perhaps even between Silo and Coffeehouse?	C.	D.6	Mount an aggressive campaign to replace existing outdated water fixtures with low-flow/high efficiency water fixtures across campus to improve water conservation
A.1.g.	Maintain or reduce current noise levels on campus	B.7.	Place signs in all restrooms and other areas with water use with information on how and where to report leaks or malfunctioning toilets		D.7.	Investigate water harvesting using cisterns to reduce irrigation water withdrawals from aquifer
A.2	B) Bikeable campus – build on the UC Davis legacy to make the campus even more attractive and effective for bicyclists	B.8	Reinstate the Horticoorps (campus volunteers who assist in maintaining and improving our grounds), team up with Arboretum volunteers, and offer a certain amount of staff release time and academic credit for validated work.		D.8	Experiment with reclaimed water use to improve Arboretum Waterway water quality and for irrigation
A.2.a	Improve pathways for bicyclists, remove unnecessary pathways, improve intersections and delineate cycling zones clearly with unique paving pattern or signage	B.9	Create a Principle of Sustainability as part of the Principles of Community.		D.9	Depending upon results of experimentation on Arboretum Waterway, and upon reduction of summertime irrigation usage, consider allowing sections of the Arboretum Waterway to dry out during summertime.
A.2.b	Improve bicycle parking racks and areas, provide shade/weather covering over bike parking areas; increase bike theft prevention options	B.10	Discuss the campus sustainability effort and how each new campus member can contribute personally (recycling, double-sided copying, etc.) in new student, new faculty, and new staff orientations.		D.10	Develop an on-site approach to animal wastes management for such facilities on campus

	Sustainable campus planning goal: Objective/Implementation action	A.	B.	C.	D.	Plan, build and maintain an integrated, "green" infrastructure
A.2.c	Provide small rooms in buildings for cyclists to change	B.11	Choose a book with a sustainability theme for the Campus Book Project. Build a year of kick-off events around the book and the theme.		D.11	Moderate campus temperature (heat island effect): possible methods include increasing shading over surface parking lots, streets and sidewalks; removing paving; using high-albedo roofing materials.
A.2.d.	Make bicycles available to students at a subsidized cost; consider making some bicycles available on a day-use basis that can be checked out by bus or other transit riders or carpoolers.				D.12	Reduce amount of night lighting, replace IM Field lights, use "smart lights" such as those developed by the UC-Davis California Lighting Technology Center
A.2.e.	Quickly remove unused bicycles/offer incentives to departing students to turn in their bicycles					
A.2.f.	Marketing for bicycle riding					
A.2.g.	Add "conierge" services for bicyclists (and pedestrians) similar to those offered to carpoolers and vanpoolers: emergency rides home, e.g. Consider also creating "satellite" bike barns around campus with different hours, or some 24/7/365 air pumps sprinkled around campus.					

	Sustainable campus planning goal: Objective/Implementation action	B.	Know ourselves and have fun doing so (learning, discovery, engagement)	C.	Craft a regenerative landscape	D.	Plan, build and maintain an integrated, "green" infrastructure
A.	Promote a "human-powered" campus:	B.	Know ourselves and have fun doing so (learning, discovery, engagement)	C.	Craft a regenerative landscape	D.	Plan, build and maintain an integrated, "green" infrastructure
A.3	C) Reduce use of carbon-fueled vehicles						
A.3.a	Implement Alternative Transportation Study recommendations to reduce campus vehicle trips						
A.3.b.	Build local housing (West Village) to facilitate the above strategies and goals.						
A.3.c	Study a Ride Card program for pedestrians & cyclists.						
A.3.d	Design and begin program to switch Fleet over to alternative fueled vehicles, where appropriate						
A.3.e	Improve bus stops by adding benches, shelter and boarding areas that do not become mud puddles during rains, as part of a continuous bus network improvement effort.						
A.3.f	Possibly engage the UC Davis Road Ecology Center (at the John Muir Institute of the Environment) in considering campus circulation system planning.						

4. Efforts to date

A. Promote a “human powered” campus

Walkable campus

- A physical plan for the campus is being mapped and refined (late 2005) that will provide a planning framework for siting new buildings and adjacent circulation; the next step is a multi-year capital improvement plan.
- In general, there is a campuswide shift from constructing surface parking lots to constructing parking structures, with an emphasis on keeping buildings closer together and parking at the campus periphery in order to facilitate walking around campus.
- The first stretch of the Garden Path pedestrian system has been constructed, adjacent to the new Math Sciences Addition Building.
- The pedestrian areas on East and North Quad streets have been improved and bicycle, vehicle and pedestrian circulation patterns have been clarified.
- Pedestrian amenities and circulation improvements in the Health Sciences District are planned to start construction in summer 2006.
- An administrative draft of the City of Davis Downtown–Campus Connection Concepts and Implementation Plan has been released (late 2005), which proposes pedestrian, bicycle, and automobile circulation system improvements between the downtown and east campus. A draft for public comment is expected to be released during the first half of 2006.

Bikeable campus

- UC Davis has about 15 miles of “shared use” paths (used by bicycles/pedestrians/delivery trucks/ maintenance vehicles), and probably about 16,000 bike parking spaces.
- A joint effort, kicked off in summer 2005, by Transportation and Parking Services and the Office of Resource Management and Planning is underway to build a database within a GIS to document all campus bicycle parking by quantity, location and type of bicycle rack system. This data will be used to plan replacement and additional bicycle parking.
- The Long Range Development Plan has a bikeway plan (page 79) that lays out a circulation concept for bicycles on campus, and ways for paths to connect to off-campus paths and destinations.
- In 2002, Transportation and Parking Services prepared a Draft UC Davis Bicycle Plan, outlining existing operations and plotting future high, medium and low priority proposed projects to be funded through grants. The plan estimated that during good weather in fall and spring quarters, between 15,000 and 18,000 bicycles are in use on campus on weekdays.
- UC Davis TAPS successfully applied for grant funding for bikeway connections to off-campus paths and lanes (for example, paving the Aggie Village bike path, and for paving parallel to Russell Boulevard).
- Bicycle lanes are under construction along Hutchison Drive from La Rue Road west to County Road 98; completion is estimated for summer 2006.
- A new bicycle path connecting Hutchison Drive to the Arboretum, near the Silo, is planned for construction during 2006.
- A bicycle path map for UC Davis and the City of Davis (combined) is produced as a joint effort by UC Davis Transportation and Parking Services and the City of Davis Department of Public Works, and is readily available at various locations on campus and around the city.
- The Bike Barn operates from 9:00 am to 4:00 pm Monday through Friday, offering free tire inflation, bike repair and maintenance for competitive fees, and bicycles for sale.
- Biannual auctions of abandoned bicycles are hosted each fall and spring to provide affordable bicycles to incoming students.

Reduce use of carbon-fueled vehicles

- A travel mode survey for the campus was conducted in fall 2002 as part of the 2003 Long Range Development Plan (LRDP) process. The campus modal split at that point was 39.9% commuters used single occupancy vehicles (SOVs), 1.7% commute in car- or vanpools, 17.1% commute by transit (bus or train), 3.1% are pedestrian commuters, and 38.3% are bicycle commuters. Tellingly, 73.9% of staff and 53.8% of faculty drive in SOVs, which would seem to indicate the increasing pressure of housing prices as against the salaries the university can afford to offer its employees.
- As part of the 2003 LRDP, West Village, a neighborhood on the west campus, was proposed. West Village would provide below-market housing for UC Davis faculty, staff, and students, which would reduce the number of SOV

trips to campus, as residents would be expected to take Unitrans transit or bicycle or walk to campus from their adjacent neighborhood, and with few exceptions would not be able to get on-campus parking permits. The neighborhood is now in planning for Phase I, and a construction start is expected in summer 2006.

- An Alternative Transportation Study has been funded and a review draft has been completed. Additional funding for the final report and set of recommendations has been granted by Transportation and Parking Services (TAPS). The completed study is expected in May 2006, after which TAPS will begin executing appropriate recommendations.
- TAPS implemented a car rental program in 2005 that helps students (including those less than 25 years old), faculty and staff accomplish trips requiring a car.
- The campus is currently planning a \$1,500,000 revamped Unitrans terminal across from the Silo to improve bus operations through central campus, as well as improve bicycle and pedestrian connections.

B. Know ourselves and have fun doing so (learning, discovery, engagement)

- After construction, signage explaining aeration tubes for oak tree roots at the North Entry Parking Structure was installed to teach passers-by about this system.
- A soil profile of soil types from the Sierra to the coast has been installed in the court between Plant and Environmental Sciences Building and Veihmeyer Hall.
- A coast redwoods grove in the Arboretum was revamped with additional explanative signage in 2004.
- The Arboretum GATEways program, which stands for Gardens, Art, and the Environment, is in a planning phase. This campus-wide initiative centers on the Arboretum and builds on an existing art-science fusion program in Entomology. The goal is to welcome visitors and educate them about the academic mission of the university through gardens, public art, educational signage, exhibits, and interactive programs.

C. Craft a regenerative landscape

Grounds maintenance

- The UC Davis Grounds Division maintains or oversees*:
 - 100 acres of turf
 - 75 acres of shrubs and groundcover
 - 116 acres of canopy cover (which translates to 17,500 trees)
 - 500 acres of hardscape (roads, sidewalks, plazas, and other paved surfaces)
 - 300 acres of non irrigated land such as roadsides and empty fields on the campus core
- Grounds Division fuel usage in 2004: 7,380 gallons of unleaded gasoline, and 15,780 gallons of red diesel (a fuel grade).
- In spring 2005, the first batch of campus olive oil was released from olives harvested off of campus trees. The pilot project involved moving from a maintenance effort of removing olives from campus pathways, at a cost of approximately \$60,000 per year, to harvesting the olives before they drop and pressing them as UC Davis olive oil. One hundred gallons of oil were produced in the pilot program. The pilot program proved very popular, and in fall 2005, harvesting began for a new bottling of olive oil; 500 gallons of oil are expected to be produced, with a net gain of \$30,000.
- In 2004, Grounds Division deployed the Hundred Year Tree Plan, with the goals of improving cultivation practices, and preserving and restoring the historic campus “urban forest.” Every year, the campus will plant trees to provide canopy cover for every pathway, roadway and sidewalk and to replace those that are removed, to ensure future generations have a mature landscape to enjoy.
- Grounds submitted a grant proposal to complete the centralization of the campus irrigation system intended to save over 60 million gallons of water a year.
- Diverted 300 cubic yards of green waste from the campus landfill and chipped it into mulch for reuse on the campus.
- The historic Shields Oak Grove in the west end of the Arboretum was restored to protect the long-term health of

**These figures reflect stewardship of the entire campus, including the Arboretum and off-campus facilities. The Putah Creek Riparian Reserve, Russell Ranch, and all assigned lands for research are excluded from this data, except for campus trees, which are inventoried and part of the Grounds Division delegation for care and control. In late 2005, a campus reorganization was undertaken to place Agricultural Services and Building Services (custodial maintenance) under the Grounds Division. The above figures do not reflect this late reorganization.*

this scientifically significant collection of oak trees.

- A wildlife management plan for the Arboretum was devised and is now in implementation phase.
- In 2006, Grounds will begin using animals (e.g. goats) to graze open unassigned land, instead of mowing with diesel or gas-powered tractors, in support of the College of Agriculture and Environmental Sciences Range Science Program.

Protection of agricultural lands

- In partnership with several other agencies and local governments, UC Davis contributed financially to the preservation of 299.5 acres of agricultural land with the McConeghy Ranch Conservation Easement. The campus conservation share is 6.32 acres, and the campus has taken less than 4 acres to build the Robert Mondavi Institute for Food and Wine Science.

Habitat restoration

- At Russell Ranch, 200 acres of agricultural land were restored to native grassland in 2004, and approximately 150 additional acres were restored in 2005. As part of the campus elderberry mitigation program, 6.5 acres of riparian habitat was restored in 2004 along the segment of Putah Creek that borders the Russell Ranch property.
- At the Putah Creek Riparian Reserve, from 2003 to present, 15 acres of native grassland have been restored and 200 Valley oak saplings were planted in conjunction with the UC Davis Student Chapter of the Society for Conservation Biology.
- At the California National Primate Research Center, a series of stormwater detention ponds were constructed in 2004-05, and were planted with native riparian habitat around the ponds, and native grasses were restored around the ponds.
- At the South Campus Canal, one acre of native grass cover was planted to provide bank stabilization and reduce maintenance.
- Conceptual planning is underway for several campus projects to provide non-irrigated native grass landscaping, in many cases in conjunction with bioswales and other on-site stormwater retention or detention features.

D. Plan, build and maintain an integrated, “green” infrastructure

Water usage

- UC Davis produces most of the water used by the campus by pumping groundwater from the deep aquifer (domestic/drinking water) and the shallow/intermediate aquifer (irrigation water). There is a fairly close connection between the amount of water pumped and the amount used. Approximately one-third of the water pumped is used on cooling and other processes which campus users cannot directly control. In 2003-04, domestic well production totaled 872,100,000 gallons and utility well production totaled approximately 328,576,000 gallons.
- Approximately 40 campus buildings are metered.

Waste management

- Wastewater: 1.8 million gallons/day
- Reclaimed water is used on some (lawn) landscaping at the Campus Wastewater Treatment Plant.
- Solid waste: in 2004, 20,152,610 pounds of refuse were taken to the campus landfill, and 6,957,170 pounds of refuse (including medical waste) were taken to a Sacramento landfill.

Stormwater management

- Water quality is monitored during wet weather at three points: in the Arboretum Waterway before pumping to Putah Creek; upstream of the campus discharge to Putah Creek; and downstream.
- By 2007, all of the storm lift (and sewer lift) stations will be placed on Supervisory Control And Data Acquisition (SCADA) controls, which will enhance system performance and allow for greater decision-making flexibility and rapid response remote operator control.

Energy, heating and cooling systems

- The Energy and Atmosphere subcommittee has information on campus energy consumption

5. Recommendations/Opportunities (Goal setting and decision making, as supported by the matrix table)

Our committee identified large-scale, lengthy ventures that require long-term commitment to achieve. However, the ideas we've formulated have a number of discrete steps, and what follows is set of possible first steps toward achieving the goals we set for each of our four strategies.

A. Promote a “human powered” campus

First steps for 2005-06:

- (1) Design a comprehensive circulation plan for pedestrian, bicycle and vehicle transportation on campus, together with principles of operation and vehicular restriction (matrix item A.1.a.). Map the plan. Set up meetings and workshops for involved groups that must implement the plan (UCD Architects & Engineers, Grounds, Transportation and Parking Services, Operations & Maintenance, Fire, Police, Environmental Health & Safety, Arboretum, Resource Management & Planning, Student Housing, Food Services) to explain the plan and provide the map and operating principles.
- (2) Initiate a “missing teeth” project for central campus pedestrian and bicycle circulation for parts of the circulation pattern that will not be improved by adjacent projects (matrix items A.1.b. and A.2.b.). Research and apply for relevant grant funding (Active Living by Design). Analyze most accident-prone spots on campus, work on those first.
- (3) Start a marketing plan for walking and bicycling (matrix items A.1.3. and A.2.f.). Feature campus people who walk or bike to, from, or on campus. Involve Student Health and Employee Health personnel, and consult the Active Living by Design non-profit for ideas.
- (4) Begin implementing recommendations from Alternative Transportation Study (matrix item A.3.a.).
- (5) Continue meetings of the Campus Planning and Transportation subcommittee to prioritize, plan implementation of, and continually reassess remaining items in the opportunity matrix.

B. Know ourselves and have fun doing so (learning, discovery, engagement)

First steps for 2005-06:

- (1) Create a campus green map (matrix items B.1 and B.5.). Sign up at Green Map.org to map our campus, involve our campus GIS Analyst, Chris DiDio, and ask interested staff, students and faculty to help produce a campus green map (see attached examples). Use the resulting map to share with visitors, incoming students, and the current campus community to promote our existing and on-going efforts towards a “green” campus. Devise a plan for updating the map over time.
- (2) Begin a limited campus assessment of our sustainability performance to set a baseline during 2005-06 (matrix item B.2.). Choose a set of indicators to measure, and develop an assessment process and timeline. Include plans for updating the performance assessment on a regular basis. (See NACUBO article, UC Berkeley and Chico State University assessments for further detail.)
- (3) Continue meetings of the Campus Planning and Transportation subcommittee to prioritize, plan implementation of, and continually reassess remaining items in the opportunity matrix.

C. Craft a regenerative landscape

First steps for 2005-06:

- (1) Establish principles of operation for a regenerative landscape; involve representatives from all relevant decision-making campus groups in writing the principles, formally adopt them, and make plans for regularly assessing and updating the principles, as required (matrix item C.1.).
- (2) Develop a Heritage Tree Replacement Plan (matrix item C.2.). Ascertain the type and number of trees to be planted each year to preserve our campus landscape. Develop a volunteer program to assist with the planting program. Map the trees planted using a GIS, and provide this information to relevant campus groups, such as Resource Management & Planning, Architects & Engineers, and Operations & Maintenance. Involve the development office and the Arboretum to learn of possible synergies for this program.
- (3) Continue meetings of the Campus Planning and Transportation Subcommittee to prioritize, plan implementation of, and continually reassess remaining items in the opportunity matrix.

D. Plan, build and maintain an integrated, “green” infrastructure

First steps for 2005-06:

- (1) Place signs in all restrooms and other areas with water use with information on how and where to report leaks or malfunctioning toilets (matrix item B.8.).
- (2) Research all facilities on campus that need retrofitting with low-flow/high efficiency water fixtures. Plan and begin a retrofitting campaign (matrix item D.7.).
- (3) Begin preparing a central campus comprehensive stormwater management and surface drainage plan; include EPA Low Impact Development guidelines, and options for retrofitting (matrix items D.4. and D.5.).
- (4) Replace IM Field lights with less intrusive night lights that allow for night-time recreation without shedding unnecessary light to the night sky (matrix item D.16.). Investigate options through the UC Davis California Lighting Technology Center.
- (5) Experiment with reclaimed water use to improve Arboretum Waterway water quality (matrix item D.9.).
- (6) Form a committee with all involved parties and start developing a comprehensive on-site approach to animal wastes management (matrix items D.3. and D.11.).
- (7) Continue meetings of the Campus Planning and Transportation subcommittee to prioritize, plan implementation of, and continually reassess remaining items in the opportunity matrix.

6. Pushing the bounds

Three challenging, big ideas bubbled up in subcommittee meetings:

- A. Institute accountability for utilities use (metering everyone and charging for real use);
- B. Create support for sustainability through total costing, with capital infusion for that initiative (perhaps through return from operating budget to upfront capital costs for savings realized as part of life-cycle costing); and
- C. Provide funding emphasis in capital planning for multiple story buildings

7. Sources of Innovation

During 2006, the Campus Planning and Transportation Subcommittee will do some research on successful examples of the types of activities we listed in section 2.

EDUCATION AND OUTREACH SUBCOMMITTEE REPORT

1. What is education and outreach for a sustainability program?

As with most any program on a university campus or elsewhere, education and outreach is the way that an entity communicates and educates its audience about what it has accomplished, what it plans to accomplish and why all that matters to them. In the case of a sustainability effort, it is a vital cog in helping to maintain a sustainability effort. Education and outreach builds awareness and then support (political and financial) for programs, which in turn helps to generate more awareness and more support.

2. Sustainability education and outreach on the UC Davis campus

Through University Relations, including communications, development and government and community relations, we on the UC Davis campus have an excellent opportunity to not only spread the word about sustainability efforts on our campus but also corresponding efforts on other college campuses. We have internal and external audiences to reach, and the tools to reach them, including *Dateline UC Davis*, *UC Davis Magazine*, our home page, as well as outreach to the local, national and international news media on our efforts and accomplishments. In addition, government and community relations and development personnel can help build and sustain awareness and support for our efforts.

3. Matrix of options

How the UC Davis News Service and Publications units serve the campus:

In assisting with the news media, the News Service:

- Creates media plans
- Produces press release
- Organizes press conferences and media availabilities
- Serves as facilitators between campus and media
- Coaches faculty and staff
- Teach workshops

For internal campus communication, the News Service and Publications:

- Provide leadership for the UC Davis Communications Council
- Consult on photos, writing and communication
- Write campus stories for our faculty/staff newspaper and alumni magazine (*UC Davis Magazine*)
- Publish a weekly faculty/staff newspaper (*Dateline UC Davis*)
- Maintain a Seminars & Events calendar
- Produce a home-page publication that highlights campus accomplishments
- UC Davis home page: <http://www.ucdavis.edu>

For additional information, go to: <http://ucomm.ucdavis.edu>

4. Efforts to date: A sample of publications by the UC Davis News Service:

Press releases by UC Davis News Service:

7.6.2005 Kellogg Foundation Provides \$1.5 Million for Endowed Professorship in Sustainable Agriculture

Intent on enhancing the safety, healthfulness and accessibility of the nation's food supply, the W.K. Kellogg Foundation has made a gift of \$1.5 million to establish an endowed chair to support the ...

1.28.2004 UC Davis and Sierra Nevada College Will Build Tahoe Research & Education Facility

In a historic partnership, the University of California, Davis, and Sierra Nevada College announced today that an urgently needed Tahoe environmental research and education facility will be built on...

6.5.2003 Sustainable Agriculture Summer Course Available

Reservations are now being accepted for UC Davis' annual summer course, "Sustainable Agriculture: Principles and Practices." The course, offered through the UC Davis Student Farm, will be held...

9.23.2002 Sources in Plant and Environmental Sciences

The new \$43 million Plant and Environmental Sciences Building at UC Davis was officially dedicated today with research displays and laboratory tours. The building houses a wide range of experts...

4.3.2002 Business School Debuts Sustainable Business Web Site

A Web site dedicated to bridging the gap between the demands of business and technology and the need for social and environmental responsibility has been launched by the management school at the...

5.17.2001 Students Design Retrofit of Presidio Building

Three UC Davis design students are creating a model for retrofitting buildings within the San Francisco Presidio that emphasizes how sustainable, energy-efficient design can embrace historical...

3.2.2001 Sustainability Should Factor Into Bottom Line

California's electricity blackouts and rising energy costs should be a wake-up call for people complacent about the viability of their world, according to a UC Davis professor and author on...

8.12.1999 Scientists and Policy-makers Gather for Ecosystem Congress

What: About 800 scientists, policy-makers and business people will gather next week in Sacramento to discuss the environmentally troubled Earth and its myriad ecosystems during the International...

Articles in *Dateline UC Davis*

10.21.2005 Key themes reflected in new faculty hiring

An innovative competition to identify the campus's highest priorities over the next two years will result in the addition of nearly 40 new faculty positions to programs that focus on globalization, including an agricultural sustainability institute, the global environment and studies in sustainable energy, transportation and healthy food...

5.6.2005 Green summit focuses on saving campus money, energy

Making buildings greener — more energy- and water-efficient and less wasteful — saves lots of money along with making them better places to work, say experts. Toward this goal, the...

2.6.2004 Campus collaborates on much-needed Tahoe Center

In a historic partnership, UC Davis and Sierra Nevada College announced last week that an urgently needed Tahoe environmental research and education facility will be built on the Sierra Nevada...

8.15.2003 REGENTS NEWS: Regents vote on green building, admissions testing

Establishing one of the first policies of its kind in the nation, UC regents approved a university wide policy for the design of "green" buildings and a standard for the use of "clean" energy July 17. The "Green Building Policy and Clean Energy Standard" calls for UC to adopt energy efficiency and sustainability principles in its capital projects to the best extent possible, taking into account budgetary constraints and regulatory and programmatic requirements. It also calls for UC to minimize its impact on the environment and reduce non-renewable energy use by purchasing green power from the electrical grid, promoting energy efficiency, and creating local renewable power sources...

5. Recommendations

Focus on educating the public and the news media, along with friends and elected officials, on UC Davis' major achievements and efforts in the area of sustainability. Those would include the efforts to certify the new Tahoe Center for Environmental Sciences building as a Platinum LEED building, which would make it only the second such certified building in the UC System.

Campus units such as the John Muir Institute of the Environment, the Institute of Transportation Studies and R4 also are doing innovative work that needs to be regularly pitched to the press and public.

Sustainability Committee Chair Jill Blackwelder's recently proposed budget augmentations for sustainability projects, particularly those that involve research grants to promising student-researchers, need to be publicized and presented to the numerous campus audiences that will result in sustaining and enhancing sustainability on this campus.

Specifically:

- Produce an educational/informational documentary that highlights key ways that UC Davis “walks the walk” in its commitment to sustainability, highlighting people, projects and buildings. The video could be “posted” on the campus Web site, aired on the local PBS affiliate, KVIE-TV as well as UCTV's “State of Minds” public affairs program, as well as shown on campus TV and on monitors at UC Davis booths at various sustainability trade shows and events.
- Develop a campus sustainability web site that would, among other things, promote UC's and UC Davis' sustainability mission, vision and values. In addition, it would provide links to other sustainability sites, make it easier for departments to buy sustainable products, promote the R4 recycling program and provide other waste recycling and disposal information.
- Launch a research grant competition for promising student-researchers interested in sustainability. Publicize the launch of the competition as well as the subsequent research projects undertaken and their results in campus publications, including Dateline UC Davis and UC Davis Magazine, and promote it all to outside news media coverage, including “green” publications.
- Incorporate sustainability messages into student orientation materials (both for undergraduate and graduate students) as well as into new staff and faculty orientation programs and materials. Specifically, include the UC Davis Sustainability Definition and Guiding Principles into all such materials.

6. Pushing the bounds

Getting an article published in *The Wall Street Journal*, *New York Times*, *Newsweek* or some other national publication about a major sustainability achievement or breakthrough on the UC Davis campus.

7. Sources of innovation

- UC Davis' own John Muir Institute of the Environment: <http://johnmuir.ucdavis.edu>
- UCLA Sustainable Resource Center: <http://gsa.asucla.ucla.edu/~src/index.html>
- UC Berkeley: <http://sustainability.berkeley.edu/>
- UC Santa Barbara (School of Environmental Science and Management): <http://www.bren.ucsb.edu/>
- Tufts University (Institute of the Environment): <http://www.tufts.edu/tie/>
- Berea College (Sustainability and Environmental Studies): <http://www.berea.edu/sens/>
- Harvard University (Green Campus Initiative): <http://www.greencampus.harvard.edu/>

ENERGY AND ATMOSPHERE SUBCOMMITTEE REPORT

1. What is sustainable energy and atmosphere?

The mission of the Energy and Atmosphere Sustainability Subcommittee is to develop options and recommendations for ways the campus can minimize its use of non-renewable energy sources; reduce negative impacts on the earth's atmosphere; educate and raise awareness among the campus community; and involve students and the community in these sustainability efforts.

The subcommittee will work to develop options for initiating education and outreach programs and near-term improvements in operations. The committee will study and make recommendations for longer-term demand-reduction projects and programs and strategies for purchasing renewable energy.

2. Sustainable energy and atmosphere at UC Davis

In short, sustainable energy and atmosphere at UC Davis is how close the campus can get to zero non-renewable energy use and zero atmospheric impact within its available resources, while also fulfilling its mission to educate, research and serve the community in these initiatives so that others may also pursue sustainability goals.

Formation of campus goals for increasing sustainability in these practices requires development of options, complete with life-cycle cost estimates of resources required for implementation and the relative sustainability benefits to be achieved. Some of these options have been explored and are presented here, while others remain to be investigated in this ongoing effort.

3. Matrix of options

The subcommittee has identified the following options for increasing campus sustainability in its energy and atmosphere practices:

1. Reduction of non-renewable energy use

a. Reduce total campus energy demand

Implement energy audit programs, map out campus energy use, establish benchmarks, and engage in an analysis of campus energy use over time and compared to peer institutions.

Initiate a continuous commissioning program to assure that campus building systems are operating efficiently. Establish guidelines for the replacement of inefficient building systems and inefficient central plant equipment.

Adopt LEED, LEED EB, and Lab 21 standards for campus facilities energy efficiency and sustainability practices.

Improve educational and informational programs on energy conservation and launch a new campus energy efficiency campaign that builds stronger bridges to the campus community.

Implement the 2001 Energy Advisory Committee energy conservation recommendations, updated and incorporated herein as Appendix A.

b. Increase the percentage of renewable energy in our electricity supply portfolio

(a) In accordance with UC Green Building and Clean Energy Policy goals and as may be allowable under current campus electricity procurement contracts, immediately procure 10% of the campus electricity portfolio from renewable energy sources, subject to budget availability. Increase this by 1% per year toward a goal of 20% by 2017.

(b) Define "renewable energy sources" the same as current CPUC rules for implementation of SB1078-Renewable Portfolio Standards for Investor Owned Utilities. This would include only renewable energy (as defined in California codes) generated within California and would exclude use of Renewable Energy Credits (RECs).

(c) Define "renewable energy sources" the same as in Appendix B but modified more broadly to include electricity generated from outside state boundaries and to allow the use of Renewable Energy Credits (RECs), preferably from a recognized national certification program such as Green E.

c. Reduce atmospheric impacts (from other than decreased non-renewable energy use).

(a) Participate in the California Climate Registry.

(b) Map out sources of campus atmospheric emissions to facilitate development of specific options for improvements.

4. Efforts to date

Substantial background information was gathered and distributed to the members of the Energy and Atmosphere Subcommittee in early summer, including copies of the UC Green Building & Clean Energy policy, campus Energy Master Plan, and the 2001 Energy Advisory Committee (EAC) Recommendations. The subcommittee then held a kick-off meeting in July 2005 to review its mission and the background information provided, share ideas and adopt a course of action. Several ideas for quick action were discussed, including making a recommendation to immediately begin increasing procurement of renewable energy in the campus electricity supply portfolio. It was also agreed that the members would review the background information in detail and be prepared to bring and discuss recommendations for sustainability improvements in these areas at the next meeting to be scheduled in September when the student member was back on campus.

In parallel to this effort, a separate subcommittee of an OOA/ORMP utilities task force was assembled and met several times over the late summer to review and update the recommendations from the 2001 EAC. These updated recommendations were provided to the E&A group in September before the second meeting.

A second meeting of the E&A group was held in early October to review and endorse submittal of the updated EAC list as a sustainability recommendation, to submit and review other potential E&E sustainability recommendations, and to review and approve the draft of this report.

5. Recommendations

1. Set a specific campus goal to reduce energy use in existing campus facilities by 10% by 2010 and by 25% by 2015.
 - Implement continuous commissioning and preventative maintenance program for campus buildings.
 - Expand the energy management programs.
 - Prepare a proposal to implement campus standard HVAC temperature set points and off-hour temperature set back controls.
 - Prepare 5- 10- and 15-year plans to replace inefficient central plant and building system equipment.
2. Formally adopt LEED, LEED EB and Lab 21 as campus standards.
3. Subject to budgetary limitations, approve funding to start a continuous commissioning program for campus buildings in pursuit of recommendation number 1 above.
4. Subject to budgetary limitations, approve funding for the expansion and integration of building energy management systems and the hiring of a building maintenance energy engineer to pursue improved energy efficiency in buildings.
5. Assign recommendations to specific individuals for their investigation and implementation.
6. Subject to budget availability and in accordance with UC Green Building and Clean Energy Policy goals -- and as may be allowable under current campus electricity procurement contracts -- immediately procure 10% of the campus electricity portfolio from renewable energy sources. Increase this by 1% per year toward a goal of 20% by 2017. Note that this subcommittee is continuing discussions regarding the definition of renewable energy and methods for funding such purchases as part of the campus portfolio, and recommendations on this will be provided in the future.

6. Pushing the bounds

A big long term goal would be to achieve full compliance with the UC Clean Energy and Green Building Policy goals of buying 20% of our energy from renewable sources by 2017.

7. Sources of innovation

- U.S. Environmental Protection Agency (EPA): <http://www.epa.gov>
- Association of Physical Plant Administrators (APPA): <http://www.appa.org/>
- Association of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE): <http://www.ashrae.org/>
- U.S. Green Building Council (LEED founders): <http://www.usgbc.org/>

GREEN BUILDINGS SUBCOMMITTEE REPORT

1. What are sustainable or “green” buildings?

The implementation of best practices for sustainable building can provide substantial benefits in the areas of health, productivity and well-being for members of any given community, while delivering economic and ecological benefits to the broader environment and community as well. Some of the benefits cited by the U.S. Green Building Council (USGBC) for “green buildings” include:

Health and community benefits:

- Improve air, thermal and acoustic environments
- Enhance occupant comfort and health
- Minimize strain on local infrastructure
- Contribute to overall quality of life

Economic benefits:

- Reduce operating costs
- Improve employee productivity and satisfaction
- Optimize life-cycle economic performance

Environmental benefits include:

- Enhance and protect ecosystems and biodiversity
- Improve air and water quality
- Reduce solid waste
- Conserve natural resources

In order to implement best practices effectively with limited resources, a coordinated effort of education, research and application needs to be launched. This will enable economies of scale, pooling of resources and initial enthusiasm to deliver more with limited resources in the short term, and build skills for the larger and ongoing effort to come.

2. Sustainable or “green” buildings at UC Davis

2.1 PROBLEM STATEMENT

How do we plan, design, construct, operate, maintain and renew/deconstruct buildings at UC Davis in a sustainable manner?

2.2 BACKGROUND

Buildings have a fundamental impact on our natural environment, economy, health and productivity. In the United States, buildings account for:

- 36% of total energy use/65% of electricity consumption
- 30% of greenhouse gas emissions
- 30% of raw materials use
- 30% of waste output/136 million tons annually
- 12% of potable water consumption

Breakthroughs in building science, technology and operations are available to people who want to build, operate and maintain sustainability and maximize both economic and environmental performance.

2.3 ULTIMATE GOALS

1. For existing buildings -- Operate, maintain and renew buildings to effectively support the occupants' health, productivity and well-being without adversely impacting other sensory aspects of life and work.
2. For new buildings -- In addition to the activities for existing buildings listed above, plan, design and construct buildings to effectively support the occupants' health, productivity and well-being without adversely impacting other sensory aspects of life and work.

While the change to address the design and construction of new buildings is well underway and is the focus of significant attention, the changes to address existing buildings is worthy of more resources and effort because the area of existing buildings substantially exceeds the area of new construction.

2.4 CONNECTIONS

While the subcommittee focus is on buildings, there are multiple impacts to and from other focus areas. These overlap areas will need to be explored for strategies that may serve multiple subcommittee areas. Some examples of the cross connections:

1. Site and Transportation -- Site selection and planning can have dramatic effects on building configuration and orientation, occupants' access to multiple transportation systems, construction access and many other issues. Likewise, building orientation and configuration can determine whether outside space is even habitable.
2. Energy -- Building energy use can trigger the expansion of utility infrastructure and change load management strategies.
3. Material Management -- A commitment to the purchase of energy-conserving office and laboratory equipment can reduce annual energy costs not only from the equipment itself but from the avoided cooling. If this commitment is made in the design stage for a new building, the result may be smaller and less expensive mechanical systems.

Outreach -- Buildings can act as a teaching tool, communicating everything from the intimate details of sustainable building operation to broad scope sustainability principles.

2.5 STRATEGIES

To reach the proposed ultimate goals will require a dramatic change in how buildings are conceived and managed. In order to effect this change, multiple strategies are required that roughly fall into the categories of the University Mission (Learning, Discovery and Engagement). Some possible metrics for gauging success in the suggested strategy area are shown in the tables for each strategy area. See the Tactical Plans for the Learning and Discovery Strategies in the Appendix.

2.6 LEARNING

Foster a common knowledge base regarding sustainability for multiple competency levels.

1. Public – Short term visitors to the campus.
2. Resident – Students, faculty or staff who live or work in a campus building.
3. Operator – Students, faculty or staff who have significant interactions with building services.
4. Academic – Students, faculty or staff who are involved with building and occupant-related research activities.
5. Technical – Skilled service personnel who provide planning, design, construction, operation and maintenance on campus facilities.

3. Matrix of options

Seek an understanding of the relative effectiveness of buildings in serving the occupant and other stake holders' needs. Focus efforts on areas with the greatest potential for generating operational benefits or avoiding substantial capitol costs. Also test related research results against the experience at UC Davis.

Work with other institutions and research organizations to further research in building-related areas (Labs 21, California Integrated Waste Management Board, California Lighting Technology Center at UC Davis, Center for the Built Environment at UC Berkeley, etc.).

Discovery Metrics

TITLE OF METRIC	UNITS	MEASURING
Alternatives to Building	Gross Square Footage of avoided construction per year	Ability to deliver alternatives to building
Chronic Comfort Impacts	Assignable Square Footage (ASF) with Chronic Comfort complaints (work orders) /TOTAL ASF	Response level to productivity impact
Occupant Feedback	ASF with Post Occupancy Evaluations /Total ASF	Effort to solicit feedback
Cost of Energy Ventilation Cooling Heating Lighting		
Cost of Maintenance	ASF with data on Cleaning Cost, Preventative Maintenance Cost/Total ASF	Awareness of Operating Cost (2)
Cost to Renovate	ASF with Data on Renovation Cost	Relative scale of renewal costs

By using the previous strategies to build a base for action, the critical step of building and operating green buildings can be achieved more effectively and efficiently. Additional engagement outcomes would include:

1. Increasing the field of knowledge in the building industry
2. Involving more occupant feedback in planning
3. Transitioning occupants and operators to an ownership mentality
4. Members of the campus community would carry their knowledge to their other endeavors.

Engagement Metrics

TITLE OF METRIC	UNITS	MEASURING
Green Program	Number of Detailed Project Programs (DPPs) with explicit Green Goals/Total DPPs per year	Greening of the mainstream
Validating Green	Number of projects with a peer review of self certification/Total projects per year	Commitment to validation
Leadership in Energy and Environmental Design (LEED) New Construction (NC) or Existing Building (EB) Use	ASF with LEED NC or EB Certification/Total ASF	Campus transition to Sustainable Building
Commissioning	ASF commissioned or re-commissioned within the last 5 years/Total ASF	Campus commitment to serve occupant comfort and save energy

4. Efforts to Date

EFFORTS BEFORE UC GREEN BUILDING POLICY

Before issuance of the UC Green Building Policy (see Appendix), the university had made significant strides in the following elements of sustainable buildings:

1. Energy conservation for new and renovated buildings (Savings by Design, Title 24 Exceedance, etc.).
2. Energy conservation retrofits (lighting; direct digital controls; heating, ventilation and air conditioning equipment, etc.).
3. Recycling for building occupants and construction/demolition waste.
4. Commissioning for new buildings.
5. Investigation of the U.S. Green Building Council's (USGBC's) Leadership in Energy and Environmental Design

- (LEED) for New Construction program.
- a. 3 Pilot project registered for LEED certification.
 - b. Research into cost implications of LEED certification.

EFFORTS AFTER IMPLEMENTATION OF THE UC GREEN BUILDING POLICY

Since issuance of the UC Green Building Policy (see Appendix), the University has redoubled efforts to meet the implementation requirements.

1. Staff has attended extensive training provided by the UC/CSU/IOU Energy Conservation Partnership.
2. Sustainable design expertise has been added to design professional selection criteria.
3. Design professional agreements are being updated to include sustainability requirements.
4. The General Requirements of construction contract are being updated to include sustainability requirements.
5. The Campus Standard & Design Guide is being updated to support the policy requirements.
6. Staff has been hired to support commissioning of new buildings.
7. Research Efforts are underway in several areas:
 - a. Laboratory plug load validation.
 - b. Low energy fume hood testing.
 - c. Testing of new lighting technologies (Public Interest Energy Research, or PIER, program).
 - d. Monitoring-based Commissioning.
 - e. Laboratory day lighting and light levels.

MEASUREMENT AND VERIFICATION

Because of the typically long lead times for building design and construction, measurement and validation at this point is somewhat limited.

5. Recommendations

Establish the following goals for the campus in the areas of LEED application, existing buildings, occupant commitments and research:

5.1 LEED APPLICATION

1. Achieve LEED silver certification equivalent on all projects (this requirement should remain constant with updates to LEED so that the standard ratchets upward over time).
1. Develop operations and maintenance standards to support the higher facility standards and expectations of LEED.
2. Achieve LEED silver certification equivalent on all renovations to existing buildings.
3. Develop a LEED application guide for small projects.

5.2 EXISTING BUILDINGS

1. Develop a plan for financing a more comprehensive building renewal program to supplement the Deferred Maintenance program.
2. Re-commission existing building area equivalent to the new construction area added each year.
3. Apply LEED EB (Existing Buildings) to buildings that are re-commissioned and achieve LEED EB Silver certification on 50% of those re-commissioned.

5.3 OCCUPANT COMMITMENTS

1. Perform post-occupancy evaluations on all new and re-commissioned buildings.
2. Commit to Energy Star or equivalent energy performance criteria for all purchased movable equipment.

5.4 RESEARCH

Research unintended cost drivers from user expectations and design assumptions and develop communication tools to mitigate their impact.

6. Pushing the bounds

The Big Goal would be to show a 10% annual increase on all of the strategy metrics in Part 3, and to achieve all of the individual recommended goals listed in Part 5.

7. Sources of innovation

Our own research should be the best source for innovation. In addition to that, our partners in research, peer institutions and our own building occupants and operators are all good sources. However, developing a structure for filtering and compiling the information will be critical to make it effective.

MATERIEL MANAGEMENT SUBCOMMITTEE REPORT

1. What is sustainable materiel management?

The recommendations of the Materiel Management Subcommittee are designed to increase sustainable practices by raising awareness and providing information and training, in addition to actually changing campus practices. The subcommittee membership (see Appendix) crosses organizational boundaries, as do the committees' recommendations, impacting the following entities:

- Materiel Management
- Facilities Operations and Maintenance
- Business Services
- Safety Services
- Student Affairs
- Students

2. Sustainable materiel management at UC Davis

The report acknowledges current sustainability efforts as well as establishes future goals in the following areas:

- Purchasing and Strategic Sourcing
- Bargain Barn
- Food Services
- Hazardous Waste
- Diversion of Municipal Waste
- R4 – Reduce, Reuse, Recycle, Rebuy

3. Matrix of options (See # 5: Recommendations)

4. Efforts to date

Sustainability accomplishments are varied and widespread, reflecting the composition of the subcommittee. Accomplishments to date include:

Purchasing and strategic sourcing sustainability achievements:

- The associate director, purchasing manager and strategic sourcing team actively participate in the UCOP Sustainability Committee.
- Student representatives now participate as team members on strategic sourcing procurements.
- All strategic sourcing procurements include environmental sustainability requirements. Below are typical requirements:
 - Contains materials made with recycled content.
 - Complies with the EPA ENERGY STAR® Program.
 - Uses minimal packaging and/or supplier arranges for packaging return for reuse.
 - Product is designed for remanufacturing and reuse of parts.
 - Product can be returned to the supplier at the end of its useful life for remanufacturing, refurbishing or recycling.
 - Limits on ozone, styrene and dust emissions.
- To date, environmental sustainability requirements have been included in the office supply, copier, and fax machine and printer procurements.

Sodexo sustainability achievements:

- Recycle mugs in resident dining and accepted in retail.
- Reusable bags in resident dining C-Stores.
- Pre-consumer composting in all resident dining kitchens.
- Local food source purchasing whenever possible.
- Collection of #10 food service cans.
- Cardboard recycling.
- Produce vendor purchases 90% product from California.
- Utilization of organic rice from local producer in Glen County.
- Utilization of seasonal and locally grown produce.
- Resident dining and retail offer Fair Trade coffee in operations.
- Produce vendor audits growers to ensure ecological and employee labor standards.

- Utilize recyclable packaging in “Express to Go” program when possible.
- Educational program to students on local grown products we are serving.
- Work with R4 on zero waste events.
- Recycle frying oils.
- Produce vendor utilizes backhauling strategies to ensure the freshest possible produce. In doing so, the produce company eliminates additional trucks on the roads. By backhauling the produce quickly to the produce warehouse, they can better preserve the shelf life of many perishable commodities, maintaining their optimum nutritional benefits.

Coffee House sustainability achievements:

- Pre-consumer composting.
- Recycle aluminum, glass, cardboard, oil, plastic.
- Purchase a small percent of produce from UCD Student Farms.
- Purchase produce from local farmers as possible.
- Offer Fair Trade coffee selections in the Coffee House (adding full line of Fair Trade certified only coffee in deli this fall).
- Utilize recyclable mugs in the Coffee House operation.
- Use recyclable carry trays for customers.
- Offer organic coffee, brown rice, brown rice crackers and pesto.
- Put out educational and informational signs on produce.
- Support local efforts to help educate students on sustainability efforts with vendor fairs.
- Use vegetable trimming for stock to reduce waste.

R4 Program sustainability achievements:

- Reached 50% diversion goal with management and coordination of materials.
- Collected indoor and outdoor reusable or recyclable materials such as mixed paper, cardboard, metal, green waste, aluminum cans, glass and plastic bottles, batteries, pipette boxes, CDs, cell phones and ink jets.
- Established the Waste Minimization and Deskside Recycling Program (mini-bin system) in 15 buildings which diverted 80% of all indoor waste.
- Worked with ASUCD, Architects and Engineers, and Facilities Operations and Maintenance to establish specifications for the management of construction and demolition waste.
- Worked with Architects and Engineers in construction and design to assure recycling needs as part of LEED standards in construction of all new buildings.
- Established 10 multi-bin program sites that provide central drop-off locations for household and rechargeable batteries, CDs, inkjets and cell phones.
- Established a desktop household and rechargeable battery recycling collection program.
- Created a Styrofoam peanuts reuse program.
- Completed more than 100 work orders annually requesting office cleanouts.
- Promoted Buy Recycled Program:
 - Encouraged the purchase of recycled content paper and other recycled content items through a directive from the office of the vice chancellor for administration.
 - Created an education and promotion program for environmentally preferred products.
- Started “Spot a Mug” program to promote the use of reusable containers.
- Won EPA Award for Environmental Achievement on the Zero Waste Program for Special Events: Diverting on average 80-100% of waste at small to large events:
 - Thank Goodness For Staff
 - Whole Earth Festival
 - Service Fair
- Created the “Food Focus” committee with Campus food waste generators (Sodexo, Coffee House) to reduce food waste and opportunities to compost.
- Worked with ASUCD Project Compost in efforts to compost campus organics.
- Worked with the ASUCD Environmental Policy and Planning Commission on waste reduction and recycling programs and assisted in drafting resolutions and bills.
- Worked with Student Housing and On Campus Housing to educate and promote waste reduction and recycling programs in residence halls:
 - RA Training
 - Resource Recovery Drive/Exchange
 - Recyclemania Competition
 - Move-in

- Resource Faire
- Education and promotion presentations with residents

Facilities Operations and Maintenance, Custodial Services sustainability achievements:

- All paper products in rest rooms, conference rooms and labs are composed of 80% recycled content. Cost: an estimated \$170,000 is expended on these items annually.
- Currently, the campus is using two cleaning products from the 3M Twist and Fill product line that are certified by Green Seal as environmentally preferable.
- All floor machines are battery powered.
- Two electric vehicles.

Environmental Health and Safety (EHS) sustainability achievements:

- Oversees the chemical exchange program to facilitate use of excess chemicals in inventory instead of new purchases.
- In cooperation with chemical managers from throughout the UC system, contracts have been established for hazardous waste disposal, which includes recycling of oil, antifreeze and Freon.
- New disposal methodologies, including the separation of waste to reduce the amount of “red bag” medical waste.

5. Recommendations

	Recommendation	Lead Organization	Tasks	Status/ Comments/ Dependencies	Target Date
1	Develop a sustainability Web site	Materiel Management, Purchasing		Requires resources from AFS Educational & Support Services	4/1/06
1.1			Link to other sustainable sites (i.e. EPA, Energy Star, PGE, CA Integrated Waste Management Board, Policies/Regs)		4/1/06
1.2			Promote UC System and UC Davis sustainability mission, vision and values		4/1/06
1.3			Promote campus recycle programs-link to R4 Program		4/1/06
1.4			“What you can do to participate” information		6/1/06
1.5			Waste disposal information including E-waste		6/1/06
1.6			Make it easy for departments to find UCD Buy sustainable products, including recycled paper, green office cleaning products, green janitorial products, etc.		6/1/06
1.7			Promote energy star product specifications		4/1/06
1.8			Promote sustainable products and vendors under contract		6/1/06
1.9			List of campus resources that can provide assistance		6/1/06
1.10			Link to EH&S Waste Minimization Program		6/1/06

1.11			Link to EH&S Chemical Exchange Program and inventory of existing chemical products	EH&S must provide information online	6/1/06
1.12			Publish success stories	R4 Program to provide or link to R4 website	6/1/06
1.13			Provide checklist for departments to self evaluate	R4 Program to provide or link to R4 website	6/1/06
2	Increase sustainable purchasing practices within the Purchasing Department	Materiel Management, Purchasing/Strategic Sourcing			
2.1			Brainstorm ideas for quick-wins		Ongoing-3/1/06
2.2			Conduct training for buying staff in sustainable products, resources and specifications		3/1/06
2.3			Create a campus education strategy addressing requirements for sustainable purchasing		4/1/06
2.4			Add sustainable specifications to bids whenever possible, including packaging, Energy Star, Recycling, Take back pallets, Chemical containers, drums, etc.		Ongoing-3/1/06
2.5			Include consideration of sustainable elements in cost per quality point evaluations.		Ongoing
2.6			Include student representation on RFP committees		Ongoing
3	Hold a sustainability trade fair showcasing vendors and contractors that furnish sustainable products and services	Materiel Management Purchasing/Strategic Sourcing, Bargain Barn, R4 Program, Facilities-Custodial Services Reprographics, Sodexo/ Student Services			10/31/06
4	Pilot green cleaning products	Facilities Operations & Maintenance, Custodial Services			
4.1			Identify green cleaning products to be tested for use in campus building maintenance	Spartan, Clean Source, Hilyard have been selected for testing	Complete
4.2			Select 2 buildings to pilot use of green cleaning products		11/1/05

4.3			Test cleaning products identified		1/1/06
4.4			Train custodial staff in the pilot buildings on benefits of green products		2/1/06
4.5			Implement use of green products in 2 pilot buildings		3/1/06
4.6			Evaluate results of pilot		4/1/06
4.7			Determine next steps		4/15/06
5	Develop a tracking and recycling program for consumer electronic devices	R4 Program/ Equipment Management/Bargain Barn			7/1/06
6	Establish a campuswide waste prevention and recycling policy	R4 Program		In partnership with members of the Material Mgmt. Sustainability Subcommittee	12/31/06
6.1			Draft Policy	Policy is in the drafting process	
6.2			Determine comment and approval processes		
6.3			Circulate draft policy and collect comments		
6.4			Conduct final analysis resulting from comment process		
6.5			Submit policy along with results of analysis for final approval		
6.6			Upon final approval, develop a series of actionable tasks for policy rollout and implementation		
7	Develop a departmental sustainable practices assessment program	Facilities Operations & Maintenance, R4 Program			12/31/05
8	Increase sustainable practices in food service	Sodexo			
8.1			Test the sales of organic and conventional products side by side, with pricing reflecting true costs and collateral information educating the consumer on the benefits of buying organic		Fall 2005 Winter 2006
8.2			Increase the marketing, education and usage of many of the current items listed above		Fall 2005

8.3			Work with vendors to source more recyclable packaging		Fall 2005
8.4			Source environmentally responsible cleaning products		Fall 2005
8.5			Continue participation in a national Sodexo group that shares best practices in sourcing, marketing, educating and practicing sustainable products		Currently Ongoing
8.6			Create additional opportunities for zero waste events	In partnership with R4	Ongoing
8.7			Investigate/pursue formation of a Produce Alliance in the California region. Food Alliance is a non-profit organization that promotes sustainable agriculture by recognizing and rewarding farmers who produce food in environmentally friendly and socially responsible ways, and educating consumers and others in the food system about the benefits of sustainable agriculture.	This organization is currently very active in the Northwest and Midwest states.	12/06 to 12/07
9	Expand/enhance campus recycling programs	R4 Program			
9.1			Expand Waste Minimization and Deskside Recycling Program mini-bin system to 10 additional buildings		6/30/06
9.2			Expand Waste Minimization and Deskside Recycling Program mini-bin system campus wide		6/30/07
9.3			Complete the retrofit for outdoor campus trash and recycling bins to campus standards		6/30/07
9.4			Establish a technical assistance and educational program for construction and demolition recycling	In cooperation with Architects and Engineers and Facilities Operations and Maintenance	6/30/06
9.5			Update Campus Standards and Design criteria for indoor recycling bins and space requirements		6/30/06
10	Increase sustainable practices in campus printing	R4 Program/Business Services			
10.1			Launch a litter reduction, clean classroom campaign, and illegal posting program		3/31/06

10.2			Establish a program to convert copiers and printers to default to duplex printing and use recycled paper		6/30/06
10.3			Establish a program to educate campus on ways to decrease overprinting of campus publications		6/30/06
10.4			Increase sustainable printing practices in student labs		12/31/06
11	Complete review and finalize Organics Diversion Program with Solid Waste and Grounds	R4 Program			12/31/05
12	Enhance sustainable practices in chemical acquisition, use and disposal	Environmental Health and Safety			
12.1			As each building is constructed or remodeled, work with departments to determine if a central chemical dispensary can be established	In partnership with Fire Department and Police Department	Ongoing
12.2			Enhance Chemical Exchange Program to identify chemical inventory to end-users		1/31/06 through 4/30/06
12.3			Enhance Mercury Replacement Project to reduce the amount of mercury on campus	In partnership with individual departments	1/31/06 through 12/31/10

6. Pushing the bounds

- Zero campus waste to landfills by 2025.
- Revise contracting processes, documents and specifications (recycled content, lifecycle cost and end of life), to reach goal of zero campus waste by 2025.
- Establish a sustainable food system that supports zero waste practices. Currently, there is an ongoing dialogue between students, Sodexo and the Coffee House that includes defining a sustainable food flow process and designing an implementation plan to reach short- and long-term goals.

7. Sources of innovation

The UCOP sustainability effort is building, with new resources continually being added to the website at <http://www.ucop.edu/facil/pd/sustain.html>. Links to other colleges are located on this site.

The University of Oregon maintains a comprehensive “Procurement/Contracting Environmentally Preferable Purchasing Tips and Resources” website at <http://darkwing.uoregon.edu/~eic/>. This website provides suggestions for purchasing managers, as well as provides links to a number of relevant resources.

Other University resources:

- UC Santa Cruz Food System website: http://www.ucscsec.org/blueprint_and_summit/FSWG.html
- University of Missouri Food Systems Project: <http://www.foodcircles.missouri.edu/>
- UC Santa Barbara: <http://www.sustainability.ucsb.edu/>
- UC Berkeley: <http://sustainability.berkeley.edu/>
- University of British Columbia: <http://www.sustain.ubc.ca/>

Northeast Recycling Council is a consortium of 10 northeastern states that, among other things, maintains a comprehensive, environmentally preferable purchasing Web site at www.nerc.org. The site contains a wealth of information including studies, policies and numerous links to environmentally preferable products by category.

Green Seal (www.greenseal.org) is an independent, non-profit organization that strives to achieve a healthier and cleaner environment by identifying and promoting products and services that cause less toxic pollution and waste; conserve resources and habitats; and minimize global warming and ozone depletion. Green Seal has no financial interest in the products that it certifies or recommends or in any manufacturer or company. Green Seal's evaluations are based on state-of-the-art science and information, using internationally recognized methods and procedures. Thus, Green Seal provides credible, objective, and unbiased information whose only purpose is to direct the purchaser to environmentally responsible products and services.

The **U.S. Environmental Protection Agency** maintains "The Best Management Practices (BMP) Catalog: Case Studies" for New England Colleges and Universities on their website at <http://www.epa.gov/NE/assistance/univ/bmpcasestudies.html>. Even though we are geographically dissimilar, UC Davis faces many of the same issues.

Zero Waste is a design principle for the 21st Century that seeks to redesign the way resources and materials flow through society. Zero Waste requires eliminating subsidies for raw material extraction and waste disposal, and holding producers responsible for their products and packaging "from cradle to cradle." The goal is to promote clean production, prevent pollution, and create communities in which all products are designed to be cycled safely back into the economy or environment: <http://www.grrn.org/zerowaste/index.html>.

Sierra Club -- Sustainable consumption is the use of goods and services that satisfy basic needs and improve the quality of life while minimizing the usage of irreplaceable natural resources and the byproducts of toxic materials, waste and pollution. Through its Web site, the Sierra Club encourages people to think about the environmental impacts of their consumption choices and provides them with specific information that will enable them to make thoughtful choices as consumers: http://www.sierraclub.org/sustainable_consumption/.

Food Alliance is a non-profit organization that promotes sustainable agriculture by recognizing and rewarding farmers who produce food in environmentally friendly and socially responsible ways, and by educating consumers and others in the food system about the benefits of sustainable agriculture: <http://www.foodalliance.org/>.

The **US Green Building Council** <http://www.usgbc.org/> is a resource for recycled building products and materials.

Zero Waste America focuses on the recycling of all materials back into nature or the marketplace in a manner that protects human health and the environment: <http://www.zerowasteamerica.org/>.

Alameda County hosts a comprehensive Web site that provides resources for environmentally preferable purchasing at <http://www.stopwaste.org/home/index.asp>.

The **Society for Nutrition Education** (SNE) represents the unique professional interests of nutrition educators in the United States and worldwide. SNE is dedicated to promoting healthy, sustainable food choices and has a vision of healthy people in healthy communities: <http://www.sne.org/>.

The mission of the **Center for Sustaining Agriculture and Natural Resources** is to foster approaches to agriculture and natural resource stewardship that are economically viable, environmentally sound, and socially responsive: www.csanr.wsu.edu.

The mission of Portland's **Office of Sustainable Development** is to provide leadership and to contribute practical solutions to ensure a prosperous community where people and nature thrive, now and in the future: www.sustainable-portland.org.

Sustainable Foodservice LLC creates and disseminates knowledge about sustainability and corporate responsibility to help hospitality businesses strengthen their own performance economically and to better serve society: www.sustainablefoodservice.com.

UC Davis Sustainability Advisory Committee

- **Jill Blackwelder**, Office of Administration,
Committee Chair
- **Mitchel Benson**, University Communications;
Chair, Education and Outreach Subcommittee
- **Mark Champagne**, ASUCD
- **Ardie Dehghani**, Architects and Engineers
- **Carl Foreman**, Environmental Health and Safety
- **Sal Genito**, Grounds
- **Susan Handy**, Academic Senate
- **Rick Keller**, Office of Resource Management and Planning
- **Janice King**, Purchasing;
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- **Camille Kirk**, Office of Resource Management and Planning;
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- **Nancy Mathison**, California Student Sustainability Coalition (Student)
- **Anne Pestolesi**, ASUCD (Student)
- **Justin Regnier**, Graduate Student
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Co-chair, Materiel Management Subcommittee
- **Bob Smiggen**, Student Housing
- **Joe Stagner**, Operations and Maintenance (Utilities);
Chair, Energy and Atmosphere Subcommittee
- **Bill Starr**, Architects & Engineers;
Chair, Green Buildings Subcommittee
- **Allen Tollefson**, Operations and Maintenance (Maintenance)
- **Mark Van Horn**, Academic Federation
- **Will Watson**, Business Services
- **Ken Woodard**, Contracting

2006 Sustainability Advisory Committee Report

- Editor: **Mitchel Benson**, University Communications
- Logo and Design: **Jan Conroy**, University Communications



BLUEPRINT FOR A GREEN FUTURE: APPENDICES

University of California, Davis
January 2006

APPENDIX A:

Campus Planning and Transportation Subcommittee

Areas of focus:

- Environmental Impact Report (EIR) issues/requirements
- Green space
- Landscaping and water use
- Lighting
- Site planning issues
- Stormwater
- Transportation optimization

Pearce, Joshua M. and Christopher F. Uhl. 2003. Getting it done: Effective sustainability policy implementation at the university level, *Planning for Higher Education* 31(3): 53-61.

Lyle, John Tillman. 1994. *Regenerative design for sustainable development*. John Wiley & Sons.

2003 Long Range Development Plan (LRDP) and LRDP EIR (available online at: www.ormp.ucdavis.edu/environment-review/lrdp.html)

Presentation on campus planning to Campus Planning & Transportation subcommittee (CPT), by Bob Segar

Draft Alternative Transportation Study

Draft Sustainable Transportation Assessment

Presentation on campus parking and transportation to CPT, by Cliff Contreras

For more on specific bicycle improvements for infrastructure, see: www.cyclecity.dk/eng/fysiske_forbedringer.asp

Draft Campus Landscaping Standards

Campus Green Space statement from Joel Biederer

Presentation on campus grounds management and planning to CPT, by Sal Genito

UC Davis Urban Forest Study

Putah Creek Riparian Reserve Plan

Presentation on campus water services to CPT, by David Phillips

Water well production data from David Phillips

Low impact development information from EPA

Solid waste/landfill data from Jason Aller

Campus Planning and Transportation Subcommittee participants:

- Camille Kirk, Chair, Office of Resource Management and Planning (ORMP) – Environmental Planning
- Joel Biederer, Student Housing
- Clifford Contreras, Vice-Chair, Transportation and Parking Services
- Sal Genito, Grounds
- Susan Handy, Faculty, Environmental Science & Policy
- Karly Kaufman, Student
- David Phillips, Water and Waste Services
- Bob Segar, Campus Planning
- Jonathan Woolley, Student

Additional reviewers:

- Rick Keller, ORMP – Capital Planning
- Sid England, ORMP – Environmental Planning

- Additional information sources: Andrew Fulks, Matt Dulcich, Karl Mohr, Chris DiDio, Isabelle Duvivier

APPENDIX B:

Education and Outreach Subcommittee

Areas of focus:

- Coordinate with Communications Council and senior advisers
- Document actions and progress:
 - Best practices
 - Consumption/use metrics
 - Performance measures
- New employee orientation
- Promote individual responsibility
- Routine communications
 - California Aggie
 - Campus Web site
 - Dateline UC Davis
 - UC Davis magazine
- Student handbook

Education and Outreach Subcommittee participants:

- Mitchel Benson, Chair, University Communications
- Leslye Hays, Offices of the Chancellor/Provost
- Anne Pestolesi, Student
- Diane Russell, Student Housing

APPENDIX C:

Energy and Atmosphere Subcommittee

Areas of focus:

- Air emissions
- Demand-side consumption
- Energy use policies
- Identification of highest payback area of focus
- Identification of outdated and energy-inefficient equipment
- New building design criteria
- Supply-side procurement and/or generation

Definition of “Renewable Energy” in California Codes

From the Public Utilities Code:

399.12. For purposes of this article, the following terms have the following meanings:

- a) (1) “Eligible renewable energy resource” means an electric generating facility that is one of the following:
 - 1) The facility meets the definition of “in-state renewable electricity generation technology” in Section 25741 of the Public Resources Code.
 - 2) A geothermal generation facility originally commencing operation prior to September 26, 1996, shall be eligible for purposes of adjusting a retail seller’s baseline quantity of eligible renewable energy resources except for output certified as incremental geothermal production by the Energy Commission, provided that the incremental output was not sold to an electrical corporation under contract entered into prior to September 26, 1996. For each facility seeking certification, the Energy Commission shall determine historical production

trends and establish criteria for measuring incremental geothermal production that recognizes the declining output of existing steamfields and the contribution of capital investments in the facility or wellfield.

3) The output of a small hydroelectric generation facility of 30 megawatts or less procured or owned by an electrical corporation as of the date of enactment of this article shall be eligible only for purposes of establishing the baseline of an electrical corporation pursuant to paragraph (3) of subdivision (a) of Section 399.15. A new hydroelectric facility is not an eligible renewable energy resource if it will require a new or increased appropriation or diversion of water under Part 2) commencing with Section 1200) of Division 2 of the Water Code.

4) A facility engaged in the combustion of municipal solid waste shall not be considered an eligible renewable resource unless it is located in Stanislaus County and was operational prior to September 26, 1996. Output from such facilities shall be eligible only for the purpose of adjusting a retail seller's baseline quantity of eligible renewable energy resources.

From the Public Resources Code:

25741. As used in this chapter, the following terms have the following meaning:

(a) "In-state renewable electricity generation facility" means a facility that meets all of the following criteria:

(1) The facility uses biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation of 30 megawatts or less, digester gas, municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal current, and any additions or enhancements to the facility using that technology.

(2) The facility is located in the state or near the border of the state with the first point of connection to the Western Electricity Coordinating Council (WECC) transmission system located within this state.

(3) For the purposes of this subdivision, "solid waste conversion" means a technology that uses a non-combustion thermal process to convert solid waste to a clean-burning fuel for the purpose of generating electricity, and that meets all of the following criteria:

(A) The technology does not use air or oxygen in the conversion process, except ambient air to maintain temperature control.

(B) The technology produces no discharges of air contaminants or emissions, including greenhouse gases as defined in Section 42801.1 of the Health and Safety Code.

(C) The technology produces no discharges to surface or groundwaters of the state.

(D) The technology produces no hazardous wastes.

(E) To the maximum extent feasible, the technology removes all recyclable materials and marketable green waste compostable materials from the solid waste stream prior to the conversion process and the owner or operator of the facility certifies that those materials will be recycled or composted.

(F) The facility at which the technology is used is in compliance with all applicable laws, regulations, and ordinances.

(G) The technology meets any other conditions established by the commission.

(H) The facility certifies that any local agency sending solid waste to the facility diverted at least 30 percent of all solid waste it collects through solid waste reduction, recycling, and composting. For purposes of this paragraph "local agency" means any city, county, or special district, or subdivision thereof, which is authorized to provide solid waste handling services.

(b) "Renewable energy public goods charge" means that portion of the non-bypassable system benefits charge authorized to be collected and to be transferred to the Renewable Resource Trust Fund pursuant to the Reliable Electric Service Investments Act (Article 15 (commencing with Section 399) of Chapter 2.3 of Part 1 of Division 1 of the Public Utilities Code).

(c) "Report" means the report entitled "Investing in Renewable Electricity Generation in California" (June 2001, Publication Number P500-00-022) submitted to the Governor and the Legislature by the commission.

Energy and Atmosphere Subcommittee participants:

- Joe Stagner, Chair, Operations and Maintenance (Utilities)
- Ardie Dehghani, Architects and Engineers
- Clyde Froelich, Student Housing
- Carrie Harvilla, Student
- Charles Madison, Operations and Maintenance
- Paul Schwartz, ORMP
- Anthony Wexler, Faculty, Mechanical and Aeronautical Engineering

APPENDIX D:

Green Buildings Subcommittee

Areas of focus:

- Building remodeling
- Coordinate new building energy issues with Energy and Atmosphere Subcommittee
- EIR issues/requirements
- Indoor environmental air quality
- Material/finish selection
- New construction
- Water use in buildings

1 - TACTICAL PLANS FOR LEARNING AND DISCOVERY STRATEGIES

1.1 LEARNING

Develop curriculum for different competency levels and audiences

General – Principles of Sustainability or incorporate a sustainability paragraph in the existing document.

Resident – Stress the partnership between the Operators and the Technical Operators.

Identify and research building facts to tell the campus story.

Develop delivery methods for audiences

General – Signage and brochure, campus book project?

Resident – Signage, Student Affairs orientation class, Regular articles in the *Aggie, Dateline*

Operator – Signage, Building Orientation, tie to EH&S training

Develop academic curriculum coordination (Institute, i.e., Center for the Built Environment or Student Environmental Center as clearinghouse?)

Environmental Design, Environmental Engineering, etc.

1.2 DISCOVERY

Provide an ongoing working group of people with intimate knowledge about a specific building to serve as a representative body for monitoring of building performance? This should be supplemented by holistic forensic analysis capability in-house

The working group should serve as a “building committee” for the life of the building and its membership should include representatives from ORM&P, A&E, O&M (Control shop +1), MSOs of occupant departments, etc.

Environmental Design department could require students to perform Post Occupancy Evaluations as a learning tool. User expectations will need to be managed effectively. If the buildings slated for POEs are chosen because of their high potential for occupant concerns or because they are slated for renovation, the planning process would be well served.

Initiate a comprehensive program for using forensic studies to capture savings for additional studies – rolling funding.

APPENDIX 2- UC GREEN BUILDING POLICY

(See http://www.ucop.edu/facil/greenbldgs/UC_green_clean.pdf)

APPENDIX 3 - UCD SUSTAINABLE DESIGN MATRIX

(See Exhibit L at end of appendices)

APPENDIX 4- LEED INFORMATION

The Leadership in Energy and Environmental Design (LEED™) Green Building Rating System represents the U.S. Green Building Council's effort to provide a national standard for what constitutes a "green building." Through its use as a design guideline and third-party certification tool, it aims to improve occupant well-being, environmental performance and economic returns of buildings using established and innovative practices, standards and technologies.

LEED provides a framework for assessing building performance and meeting sustainability goals. Based on scientific standards, LEED emphasizes strategies for sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. LEED recognizes achievements and promotes expertise in green building through a system offering project certification and professional accreditation.

LEED was created to:

- define "green building" by establishing a common standard of measurement
- promote integrated, whole-building design practices
- recognize environmental leadership in the building industry
- stimulate green competition
- raise consumer awareness of green building benefits
- transform the building market

LEED for NEW CONSTRUCTION (LEED NC)

LEED NC is the basic program for new construction and major renovation projects from which all other programs are developed.

LEED EB

LEED for Existing Buildings (LEED-EB) is a consensus-based system for certifying green building performance, operations, and maintenance. It provides a recognized, performance-based benchmark for building owners and operators to measure operations, improvements and maintenance on a consistent scale. LEED-EB is a road map for building operators for delivering economically profitable, environmentally responsible, healthy, productive places to live and work.

LEED-EB provides a road map for property managers, portfolio owners, and service providers to drive down operational costs, while increasing occupant productivity in an environmentally responsible manner. It is a set of voluntary standards for the sustainable upgrades and operation of buildings not undergoing major renovations. It provides sustainable guidelines for building operations, periodic upgrades of building systems, minor space use changes and building processes.

LEED-EB addresses exterior building site maintenance programs, efficient/optimized use of water and energy, purchasing of environmentally preferred products, waste stream management and ongoing indoor environmental quality (IEQ). In addition, LEED-EB provides sustainable guidelines for whole-building cleaning/maintenance, recycling programs and systems upgrades to improve building energy, water, IEQ and materials use.

APPENDIX 5 – LEED NC CREDIT LIST

(See: https://www.usgbc.org/FileHandling/show_general_file.asp?DocumentID=1096)

APPENDIX 6 – LEED EB CREDIT LIST

(See: https://www.usgbc.org/FileHandling/show_general_file.asp?DocumentID=679)

APPENDIX 7 – DEFINITIONS OF TERMS

DEFINITIONS

OPERATION

Systems Monitoring/Adjustment

Cleaning

Waste Removal

User support level “user friendliness”

Reduced maintenance

Flexibility – use, bench, systems levels

Expandability

MAINTENANCE

Preventative Maintenance – lubrication, filters

Testing – fire suppression

Deferred Maintenance

RENEWAL

Maintain existing use

Serve new use

Ease of deconstruction

Green Buildings Subcommittee participants:

- Bill Starr, Chair, Architects and Engineers
- Pat Harrison, Faculty, Design Program
- Cynthia Ingham-Bachman, ORMP
- Bob Smiggen, Student Housing

APPENDIX E:

Materiel Management Subcommittee

Areas of focus:

- Diversion of municipal waste
- Food waste
- Green waste
- Hazardous waste
- Means and methods
- Paper, plastic, metals
- Purchasing policies
- Regulations
- R4 program
- Strategic sourcing

Material Management Subcommittee participants:

Representation Role or Unit	Subcommittee Member	Email Address
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Best Practices	Janice King - Purchasing Manager	janking@ucdavis.edu
Student Affairs/Memorial	Brett Burns	bcburns@ucdavis.edu

Exhibit L: Sustainable Design Matrix

Item: (Note 1)	Description	UC Davis Baseline	UC Davis Possible	Responsibility: U = University DP = Design Professional C = Contractor	Phase when documentation is provided	Documentation Reference
SUSTAINABLE SITES						
SS Prerequisite 1 - Erosion & Sedimentation Control	Design a sediment and erosion control plan, specific to the site, that conforms to United States Environmental Protection Agency (EPA) document No. EPA 832/R-92-005 September 1992), Storm Water Management for Construction Activities, Chapter 3 or local erosion and sedimentation control standards and codes, whichever is more stringent. The plan shall meet the following objectives: Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse. Prevent sedimentation of storm sewer or receiving streams and/or air pollution with dust and particulate matter.	Y		U	CA	Include standard specification section 01381 in the Contract Documents
SS 4.1 - Alternative Transportation-Public Transportation Access	Locate project within 1/2 mile of a commuter rail, light rail or subway station or 1/4 mile of two or more public or campus bus lines usable by building occupants.		1	U	DPP	Bus service area map
SS 4.2 - Alternative Transportation - Bicycle Storage & Changing Rooms	For commercial or institutional buildings, provide secure bicycle storage with convenient changing/shower facilities (within 200 yards of the building) for 5% or more of regular building occupants.	1		U, DP	CD	University provides occupancy calculation; Reference site plan, floor plan showing bike storage and showers
SS 4.3 - Alternative Transportation - Alternative Fuel Vehicles	Provide alternative fuel vehicles for 3% of building occupants and provide preferred parking for these vehicles, or install alternative fuel refueling stations for 3% of the total vehicle parking capacity of the site.	1		U	DPP	University report on bus ridership
SS 4.4 - Alternative Transportation-Parking Capacity	Size parking to meet, but not exceed, minimum local zoning requirements and provide preferred parking for carpools or vanpools capable of serving 5% of the building occupants.	1		U	DPP	University report on parking capacity and mode split
SS 5.1 - Reduced Site Disturbance-Protect or Restore Open Space	On greenfield sites, limit site disturbance including earthwork and clearing of vegetation to 40 feet beyond the building perimeter, 5 feet beyond primary roadway curbs, walkways and main utility branch trenches, and 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas in order to limit compaction in the constructed area; OR, on previously developed sites, restore a minimum of 50% of the site area (excluding the building footprint) by replacing impervious surfaces with native or adapted vegetation.		1	U, DP	DPP, CD	Define work boundary
SS 5.2 - Reduced Site Disturbance-Development Footprint	Reduce the development footprint (defined as entire building footprint, access roads and parking) to exceed the local zonings open space requirement for the site by 25%. For areas with no local zoning requirements (e.g., some university campuses and military bases), designate open space area adjacent to the building that is equal to the development footprint.	1		U	DPP	University report on development mitigation
SS 6.1 - Stormwater Management- Rate and Quantity	If existing imperviousness is less than or equal to 50%, implement a storm water management plan that prevents the post development 1.5 year, 24 hour peak discharge rate from exceeding the pre-development 1.5 year, 24 hour peak discharge rate. OR if existing is greater than 50%, implement a storm water management plan that results in a 25% decrease in the rate and quantity of storm water runoff.	1		DP	SD, CD	Provide calculation of run-off in SD, Reference site applicable drawings at CD

SS 6.2 - Stormwater Management- Treatment	Construct site stormwater treatment systems designed to remove 80% of the average annual post-development total suspended solids (TSS) and 40% of the average annual post-development total phosphorous (TP) based on the average annual loadings from all storms less than or equal to the 2-year/24-hour storm. Do so by implementing Best Management Practices (BMPs) outlined in Chapter 4, Part 2 (Urban Runoff), of the United States Environmental Protection Agency's (EPA's) Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, January 1993 (Document No. EPA-840-B-92-002) or the local government's BMP document (whichever is more stringent).	1		U	DPP	University report on campuswide treatment in arboretum
SS 7.1 - Heat Island Effect - Non-Roof	Provide shade (within 5 years) and/or use light-colored/high albedo materials (reflectance of at least 0.3) and/or open grid pavement for at least 30% of the site's non-roof impervious surfaces, including parking lots, walkways, plazas, etc.; or place a minimum of 50% of parking spaces underground or covered by structured parking; or use open-grid pavement system (less than 50% impervious) for a minimum of 50% of the parking lot area.	1		U, DP	DPP, CD	University report on covered parking at DPP, Identify paving spec and planting plan at CD
SS 7.2 - Heat Islands Effect - Roof	Use Energy Star compliant (highly reflective) and high emissivity roofing (emissivity of at least 0.9 when tested in accordance with ASTM 408) for a minimum of 75% of the roof surface; or install a "green" (vegetated) roof for at least 50% of the roof area. Combinations of high albedo and vegetated roof can be used providing they collectively cover 75% of the roof area.	1		DP	CD	Reference Specification
SS 8.1 - Light Pollution Reduction - Exterior Lighting	Meet or provide lower light levels and uniformity ratios than those recommended by the Illuminating Engineering Society of North America (IESNA) Recommended Practice Manual: Lighting for Exterior Environments (RP-33-99). Design exterior lighting such that all exterior luminaries with more than 1000 initial lamp lumens are shielded and all luminaries with more than 3500 initial lamp lumens meet the Full Cutoff IESNA Classification. The maximum candela value of all interior lighting shall fall within the building (not out through the windows) and the maximum candela value of all exterior lighting shall fall within the property. Any luminaries within a distance of 2.5 times its mounting height from the property shall have shielding such that no light from that luminaries crosses the property boundary.	1		DP	CD	Reference lighting analysis
Labs21 SS 12.1 - Safety and Risk Management - Air Effluent	Meet all standards and generally accepted guidelines for outdoor protection of workers and general public from airborne chemical, radioactive and biological hazards. Use mathematical modeling, physical modeling and/or post-construction testing and certification to prove compliance. Use effluent controls that minimize generation of waste subject to special regulations.	1		U, DP	DD	Copy of wind tunnel study
Labs21 SS 12.2 - Safety & Risk Management - Water Effluent	Prevent releases of hazardous chemicals and other pollutants to sanitary sewer, using containment and engineering controls	1		U, DP		Copy of campus lab waste policy

SUSTAINABLE SITES SUBTOTAL: 8 5

WATER EFFICIENCY

Labs21 WE Prerequisite 1 - Laboratory Equipment Water Use	No domestic water shall be used "once-through" for any laboratory equipment, unless it is needed as direct contact process water.	Y		U	DPP	University letter from EH&S
WE 1.1 - Water Efficient Landscaping- Reduce by 50%	Use high efficiency irrigation technology or use captured rain or recycle site water to reduce potable water consumption by 50% over conventional means.	1		DP	CD	Calculations, reference plans
WE 3.1 and 3.2 - Water Use Reduction- 30% Reduction	Employ strategies that in aggregate use 30% less water than the water use baseline calculated for the building (not including irrigation) after meeting the Energy Policy Act of 1992 fixture performance requirements.	2		DP	CD	Calculations, reference plans
Labs21 WE 4.1 - Process Water Efficiency	Calculate and document baseline of annual process water use and process wastewater generation. Install water meters to measure process water use.	1		U	DPP	University survey, metering
Labs21 WE 4.1 - Process Water Efficiency	Adopt technologies and strategies to reduce process water use and process wastewater generation by 20%. Document the reductions from baseline.	1		U, DP	SD, W	Design Strategies in SD, Survey and Metering in W

ENERGY & ATMOSPHERE

EA Prerequisite 3 - CFC Reduction in HVAC&R Equipment	Zero use of CFC-based refrigerants in new building HVAC&R systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phase out conversion.	Y		U, DP	DPP, CD	University Utilities Letter
Labs21 EA Prerequisite 2 - Assess Minimum Ventilation Requirements	The ventilation requirements shall be determined and documented by a team including each of the following professionals: A/E Team, Laboratory Consultants, User Representative, Owner Facilities Group, Owner Environmental Health & Safety, and Commissioning Authority.	Y		U	DPP	Document in DPP
EA Credit 1 - Optimize Energy Performance	Reduce design energy cost compared to the energy cost budget for energy systems regulated by ASHRAE/IESNA Standard 90.1-1999 (without amendments), as demonstrated by a whole building simulation using the Energy Cost Method described in Section 11 of the Standard.	4		DP	DD	Savings by Design Report
EA Credit 1 - Optimize Energy Performance	Additional reduction of design energy cost	6		DP	DD	Savings by Design Report
EA 2.1 - Renewable Energy- 5%	Supply at least 5% of the building's total energy use (as expressed as a fraction of annual energy cost) through the use of on-site renewable energy systems.	1		U, DP	CD	Reference calculation and drawings
EA 3 - Additional Commissioning	Implement the following additional commissioning tasks: 1) A commissioning authority independent of the design team shall conduct a review of the design prior to the construction documents phase. 2) An independent commissioning authority shall conduct a review of the construction documents near completion of the construction document development and prior to issuing the contract documents for construction. 3) An independent commissioning authority shall review the contractor submittals relative to the systems being commissioned. 4) Provide owner with a single manual that contains the information required for re-commissioning the building systems. 5) Have a contract in place to review building operation with O&M staff, including a plan for resolution of outstanding commissioning-related issues within one year after construction completion date.	1		U, DP	All	Reference University Cx plan and report.
EA 4 - Ozone Protection	Install base building level HVAC and refrigeration equipment and fire suppression systems that do not contain HCFCs or Halons.	1		U, DP	DD	University report; Reference plans and specifications
EA 5.1 - Measurement and Verification - Building Systems	Install continuous metering equipment for the following end-uses: Lighting systems and controls, constant and variable motor loads, variable frequency drive (VFD) operation, chiller efficiency at variable loads (kW/ton), cooling load, air and water economizer and heat recovery cycles, air distribution static pressures and ventilation air volumes, boiler efficiencies, building-related process energy systems and equipment, indoor water risers and outdoor irrigation systems.	1		DP	CA	Reference plans
EA 6 - Green Power	Provide at least 50% of the building's electricity from renewable sources by engaging in at least a two-year renewable energy contract. Renewable sources are as defined by the Center for Resource Solutions (CRS) Green-e products certification requirements.	1		U	CA	Reference power agreement
Labs21 EA 11 - Improve Laboratory Equipment Efficiency	Use Energy Star™ compliant equipment or equipment in the top 25th percentile for at least 75 percent of new Class 1 and Class 2 equipment and at least 30 percent of all Class 1 and Class 2 equipment. Acceptance of equipment in the 25th percentile requires a minimum of 4 different models that meet the functional needs of the research. If only 2 or 3 functionally equivalent models are available, acceptance requires selection of the most energy efficient model.	1		U, DP	DD, CA	Reference equipment selection data
Labs21 EA 12.1 - Right-size Laboratory Equipment Load	Measure base usage of equipment electrical loads in a comparable laboratory space for each functional type of laboratory space and design electrical and cooling systems based on these measurements.	1		U	DPP	Reference DPP Appendix
Labs21 EA 12.2 - Right-size Laboratory Equipment Load - Metering	Design electrical distribution system to provide for portable or permanent check metering of laboratory equipment electric consumption. Design for safe access to electrical feeder enclosures and provide sufficient space to attach clamp-on or split core current transformers.	1		DP	CD	Reference Single Line Diagram

ENERGY & ATMOSPHERE SUBTOTAL 6 12

MATERIALS & RESOURCES

MR Prerequisite 1 - Storage & Collection of Recyclables	Provide an easily accessible area that serves the entire building and is dedicated to the separation, collection and storage of materials for recycling including (at a minimum) paper, corrugated cardboard, glass, plastics and metals.	Y		DP	CD	Reference plans
Labs21 MR Prerequisite 2 - Hazardous Material Handling	Develop a system to maintain current information about hazardous material types, quantity, location, and disposal/use histories, and deliver information to a central location.	Y		U	DPP	Sample Chem Management System Sheet
MR 1.1 - Building Reuse- Maintain 75% of Existing Walls, Floors and Roof	Maintain at least 75% of existing building structure and shell (exterior skin and framing, excluding window assemblies and non-structural roofing material).		1	DP	CD	Reference plans
MR 1.2 - Building Reuse-Maintain 100% of Existing Walls, Floors and Roof	Maintain an additional 25% (100% total) of existing building structure and shell (exterior skin and framing, excluding window assemblies and nonstructural roofing material).		1	DP	CD	Reference plans
MR 1.3 - Building Reuse- Maintain 100% of Shell/ Structure and 50% of Non-Shell/Non-Structure	Maintain 100% of existing building structure and shell (exterior skin and framing, excluding window assemblies and non-structural roofing material) AND at least 50% of non-shell areas (interior walls, doors, floor coverings and ceiling systems).		1	DP	CD	Reference plans
MR 2.1 - Construction Waste Management- Divert 50% From Landfill	Develop and implement a waste management plan, quantifying material diversion goals. Recycle and/or salvage at least 50% of construction, demolition and land clearing waste. Calculations can be done by weight or volume but must be consistent throughout.	1		U, C	CA	Reference Spec and Submittal Info
MR 2.2 - Construction Waste Management- Divert 75% From Landfill	Increase recycle and/or salvage to at least 75% of construction, demolition and land clearing waste.		1	U, C	CA	Reference Spec and Submittal Info
MR 3.1 - Resource Reuse: 5%	Use salvaged, refurbished or reused materials, products and furnishings for at least 5% of building materials.		1	DP	CD	Reference plans and specs
MR 4.1 - Recycled Content: Use 5% post-consumer or 10% postconsumer + post-industrial	Use materials with recycled content such that post-consumer recycled content constitutes at least 5% of the total value of the materials in the project or combined post-consumer and 1/2 post-industrial recycled content constitutes at least 10%. The value of the recycled content portion of a material or furnishing shall be determined by dividing the weight of recycled content in the item by the total weight of all material in the item, then multiplying the resulting percentage by the total value of the item.	1		DP	CA	Reference Spec and Submittal Info
MR 4.2 - Recycled Content: Use 10% post-consumer or 20% post-consumer + post-industrial	Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial content constitutes at least 10% of the total value of the materials in the project.		1	DP, C	CA	Reference Spec and Submittal Info
MR 5.1 - Regional Materials- 20% manufactured regionally	Use a minimum of 20% of building materials & products that are manufactured regionally within a radius of 500 miles. Manufactured refers to the final assembly of components into the building product that is furnished & installed.	1		DP, C	CA	Reference Spec and Submittal Info
MR 5.2 - Regional Materials- 50% extracted regionally	Of the regionally manufactured materials documented for MR Credit 5.1, use a minimum of 50% of building materials and products that are extracted, harvested or recovered (as well as manufactured) within 500 miles of the project site.		1	DP, C	CA	Reference Spec and Submittal Info
MR 6 - Rapidly Renewable Materials	Use rapidly renewable building materials and products (made from plants that are typically harvested within a ten-year cycle or shorter) for 5% of the total value of all building materials and products used in the project.		1	DP, C	CA	Reference Spec and Submittal Info

MR 7 - Certified Wood	Use a minimum of 50% of wood-based materials and products, certified in accordance with the Forest Stewardship Council's Principles and Criteria, for wood building components including, but not limited to, structural framing and general dimensional framing, flooring, finishes, furnishings, and nonrented temporary construction applications such as bracing, concrete form work and pedestrian barriers.	1	DP, C	CA	Reference Spec and Submittal Info
Labs21 MR 8 - Chemical Resource Management	Develop an action plan to eliminate, minimize, substitute, recycle, and dispose of harmful chemicals safely. Plan should improve distribution, and limit quantities, storage and waste		U	CD	Reference plan

MATERIALS & RESOURCES SUBTOTAL: 3 9

INDOOR ENVIRONMENTAL QUALITY

IEQ Prerequisite 1 - Minimum IAQ Performance	Meet the minimum requirements of voluntary consensus standard ASHRAE 62-1999, Ventilation for Acceptable Indoor Air Quality, and approved Addenda (see ASHRAE 62-2001, Appendix H, for a complete compilation of Addenda) using the Ventilation Rate Procedure.	Y	DP	CD	Reference Drawings
IEQ Prerequisite 2 - Environmental Tobacco Smoke (ETS) Control	Prohibit smoking in the building and locate any exterior designated smoking areas away from entries and operable windows.	Y	U	DPP	Copy of University Policy
Labs21 IEQ Prerequisite 3 - Laboratory Ventilation	Meet the minimum requirements of ANSI Z9.5 (latest version).	Y	DP	CD	Reference Drawings
Labs21 IEQ Prerequisite 4 - Exterior Door Notification System	Provide an explicit notification system for all doors leading directly from pressure-controlled laboratory spaces to the outside.	Y	DP	CD	Reference Drawings
IEQ 1 - Outdoor air delivery monitoring	Install permanent monitoring and alarm system that provide feedback on ventilation system performance to ensure that ventilation systems maintain design minimum ventilation requirements.	1	DP	CD	Reference Drawings
IEQ 2 - Ventilation Effectiveness	For mechanically ventilated buildings, design ventilation systems that result in an air change effectiveness greater than or equal to 0.9 as determined by ASHRAE 129-1997. For naturally ventilated spaces, demonstrate a distribution and laminar flow pattern that involves not less than 90% of the room or zone area in the direction of air flow for at least 95% of hours of occupancy.	1	DP	CD	Calculation
IEQ 3.1 - Construction IAQ Management Plan- During Construction	Develop and implement an Indoor Air Quality Management Plan for the construction and pre-occupancy phases of the building as follows: 1) During construction meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3. 2) Protect stored on-site or installed absorptive materials from moisture damage. 3) If air handlers must be used during construction, filtration media with Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999. 4) Replace all filtration media immediately prior to occupancy. Filtration media shall have a MERV of 13, as determined by ASHRAE 52.2-1999 for media installed at the end of construction.	1	U, C	CA	Photos
IEQ 3.2 - Construction IAQ Management Plan- After Construction	Develop and implement an Indoor Air Quality Management Plan for the construction and pre-occupancy phases of the building as follows: 1) During construction meet or exceed the recommended Design Approaches of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 1995, Chapter 3. 2) Protect stored on-site or installed absorptive materials from moisture damage. 3) If air handlers must be used during construction, filtration media with Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999. 4) Replace all filtration media immediately prior to occupancy. Filtration media shall have a MERV of 13, as determined by ASHRAE 52.2-1999 for media installed at the end of construction.	1	U, C	W	Reference schedule and filter submittal
IEQ 4.1 - Low-Emitting Materials- Adhesives & Sealants	The VOC content of adhesives and sealants must be less than the current VOC content limits of South Coast Air Quality Management District (SCAQMD) Rule #1168, and all sealants used as fillers must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.	1	DP, C	CD	Reference specification

IEQ 4.2 - Low-Emitting Materials-Paints and Coatings	VOC emissions from paints and coatings must not exceed the VOC and chemical component limits of Green Seal's Standard GS-11 requirements.	1		DP, C	CD	Reference Specification
IEQ 4.3 - Low-Emitting Materials-Carpet	Carpet systems must meet or exceed the requirements of the Carpet and Rug Institute's Green Label Indoor Air Quality Test Program.	1		DP, C	CD	Reference Specification
IEQ 4.4 - Low-Emitting Materials-Composite Wood	Composite wood and agrifiber products must contain no added urea-formaldehyde resins.	1		DP, C	CD	Reference Specification
IEQ 5 - Indoor Chemical & Pollutant Source Control	IEQ 4.4 - Low-Emitting Design to minimize pollutant cross-contamination of regularly occupied areas: 1) Employ permanent entryway systems (grills, grates, etc.) to capture dirt, particulates, etc. from entering the building at all high volume entryways. 2) Where chemical use occurs (including housekeeping areas and copying/printing rooms), provide segregated areas with deck to deck partitions with separate outside exhaust at a rate of at least 0.50 cfm per sf, no air re-circulation and maintaining a negative pressure of at least 7 PA (0.03 inches of water gauge). 3) Provide drains plumbed for appropriate disposal of liquid waste in spaces where water and chemical concentrate mixing occurs.	1		DP, U	CD	Reference Drawings
IEQ 6.1 - Controllability of Systems-Perimeter Spaces	Provide at least an average of one operable window and one lighting control zone per 200 square feet for all regularly occupied areas within 15 feet of the perimeter wall.	1		DP	CD	Reference Drawings
IEQ 6.2 - Controllability of Systems-Non-Perimeter Spaces	Provide controls for each individual for airflow, temperature and lighting for at least 50% of the occupants in non-perimeter, regularly occupied areas.	1		DP	CD	Reference Drawings
IEQ 7.1 - Thermal Comfort- Compliance with ASHRAE 55-1992	Comply with ASHRAE Standard 55-1992, Addenda 1995, for thermal comfort standards including humidity control within established ranges per climate zone. For naturally ventilated buildings, utilize the adaptive comfort temperature boundaries, using the 90% acceptability limits as defined in the California High Performance Schools (CHPS) Best Practices Manual, Appendix C - A Field Based Thermal Comfort Standard for Naturally Ventilated Buildings, Figure 2.	1		DP	CD	Provide Calculations
IEQ 7.2 - Thermal Comfort- Permanent Monitoring System	Install a permanent temperature & humidity monitoring system configured to provide operators control over thermal comfort performance & the effectiveness of humidification and/or dehumidification systems in the building.	1		DP	CD	Reference Drawings
IEQ 8.1 - Daylight and Views- Daylight 75% of Spaces	Achieve a minimum Daylight Factor of 2% (excluding all direct sunlight penetration) in 75% of all space occupied for critical visual tasks. Spaces excluded from this requirement include copy rooms, storage areas, mechanical plant rooms, laundry and other low occupancy support areas. Other exceptions for spaces where tasks would be hindered by the use of daylight will be considered on their merits.	1		DP	DD	Reference Drawings and Calculations
IEQ 8.2 - Daylight and Views- Views for 90% of Spaces	Achieve a direct line of sight to vision glazing for building occupants in 90% of all regularly occupied spaces. Examples of exceptions include copy rooms, storage areas, mechanical, laundry and other low occupancy support areas. Other exception will be considered on their merits.	1		DP	DD	Reference Drawings and Calculations
Labs21 IEQ 11.1 - Indoor Environmental Safety	Optimize indoor airflow based on CFD or physical modeling.	1		U, DP	DD, CA	Provide Report
Labs21 IEQ 11.2 - Indoor Environmental Safety	Commission all fume hoods per ASHRAE 110, with performance rating of 4.0 AI 0.1	1		U	DD, CA	Cx Report
Labs21 IEQ 11.3 - Indoor Environmental Safety	Design all alarm systems in the laboratory to be inherently self-identifying and failsafe.	1		U, DP	DD, CA	Reference Drawings

INDOOR ENVIRONMENTAL QUALITY SUBTOTAL: 12 4

INNOVATION IN DESIGN

ID 1 - Innovation in Design	Substantially exceed a LEED performance credit such as energy performance or water efficiency. Apply strategies or measures that are not covered by LEED such as acoustic performance, education of occupants, community development or lifecycle analysis of material choices.	2	2	DP	All	Provide narrative justification and calculations
ID 2 - LEED Accredited Professional	At least one principal participant of the project team that has successfully completed the LEED Accredited Professional exam.	1		DP	SD	Reference Certification Number

INNOVATION IN DESIGN SUBTOTAL: 3 2

TOTAL BASELINE: 35

Possible Additional (including labs and non-labs): 34

TOTAL: BASELINE + Possible: 69