APPENDIX 3

Feasibility Study
For a
Clean Energy Standard
For the
University of California

May 22, 2002

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Acknowledgement

This report results from a collaborative effort by the Working Group in support of the University of California Clean Energy/Green Building Steering Committee.

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I. Executive Summary

In 2002-2003, students at every University of California campus passed referenda requesting, among other things, that the university develop policies for integrating sustainability into its energy purchasing practices. Underlying the student request is a two-fold concern about the energy security of our country and the environment.

At the December 13, 2002 meeting of the Grounds and Buildings Committee, The Regents requested that the President undertake a feasibility study and develop policy recommendations, for presentation at the May 2003 meeting, for the adoption of a Green Building policy and Clean Energy[1] standard for all new building projects. This study evaluates the economic impact of the recommended clean energy standards, and associated impact on capital and building maintenance programs. Consistent with The Regents' request, the policies and standards being recommended are based on input from and coordination with students, faculty, staff, governmental agencies, and other higher education systems, as well as non-governmental organizations.

The University is moving into an unprecedented period of facilities growth, with at least 50 percent of the new space defined as complex (e.g. laboratories and medical centers) with high energy intensity. It is anticipated that by the year 2013, if the University continues its current energy practice, its cost of energy could double over costs in base-year 2000, assuming an average of 2 million square feet per year added to the University built environment. This doubling would be due both to increased energy consumption, particularly for complex space, and the recent significant increase in energy prices.

This report recommends that the University set a clean energy standard such that the University meets its new load growth with no net increase in the use of non-renewable energy.

The clean energy standard would comprise the four components described below. The clean energy elements would be combined to develop a unique solution for each of the ten UC campuses. Implementing the clean energy standard will be subject to the University's standard funding and financing criteria, and in most cases will require the development of supplemental funding such as State renewable energy subsidies and increased or redirected associated student fees and/or new voter approved fees.

There are four mechanisms for implementing the University's Clean Energy standard:

A. Energy Efficiency Retrofits

Based on available information from campus Strategic Energy Plans, it appears that there is potential for reducing the University's overall current energy consumption by up to 25 percent through the implementation of energy efficiency retrofits of existing buildings. This in itself would be sufficient to meet or exceed projected building load growth and result in no net

[1] Clean Energy is defined as energy that reduces the negative impact that energy consumption has on the environment. For this report, Clean Energy is defined as energy efficiency, renewable energy and other types of energy that have similar effects on the environment.

increase in non-renewable energy use for the University. This effort would require a substantial investment, but the resultant cost savings should be sufficient to meet the University's financing requirements. Recommendation: *Set a goal of reducing energy consumption across the University system by 10 percent by 2014 using the year 2000 as the baseline, on a per unit basis. Strive to achieve even greater energy savings of up to 25 percent.*

B. Local Renewable Energy

The potential for siting up to11 MW of renewable energy projects at the campuses appears to be technically feasible. This level of development would meet the student challenge that 25 percent of the peak demand created by our construction be produced by local renewable energy projects. This effort would require a significant investment, and the resultant cost savings from avoided energy purchases would likely not be sufficient to meet the University's financing requirements. To implement these projects would likely require additional funding from subsidies, associated student fees and/or new voter approved fees or other sources. The University will work diligently to obtain grants, subsidies, demonstration project funding and any other available funds to improve the cost benefit of this program element. Recommendation: *Set a goal of developing up to 10 megawatts of local renewable power across the University system by 2014.*

C. Grid-Based Renewable Energy

The University can purchase renewable energy from the grid or renewable energy certificates, and could voluntarily meet the requirements of the Renewable Portfolio Standard (RPS) signed into law by Governor Davis in 2002. This effort could result in an overall cost increase of approximately 2 % for electricity purchased under the University's direct access electricity supply contract. Recommendation: *Set a goal of procuring 20 percent of the University's electricity needs from renewable sources by 2017, with an initial goal of procuring 10 percent of the University's electrical needs in 2004.*

D. Other Technologies

The University recognizes that existing and emerging energy technologies can provide major environmental benefits compared to conventional energy generation technologies. Recommendation: *Set a policy to continuously evaluate the feasibility of other energy technologies that have an equivalent demonstrable effect on the environment and reduction in fossil fuel use.*

Charts 1 and 2 illustrate the various strategies campuses might employ to meet the proposed clean energy standard. The first chart shows the contribution of the various strategies to annual campus energy consumption; the second shows the contribution to campus peak energy consumption.

The top line in each chart shows projected electrical consumption or peak energy consumption for new growth assuming that new buildings will be built to UC's current energy efficiency

Standards. This new growth is compared to a baseline of calendar year 2002 consumption. The other strategies illustrate that with stringent new building standards, up to 11 megawatts of local renewable projects and a system-wide energy efficiency retrofit program that will reduce existing building loads by up to 25 percent, all of the electrical load growth for new buildings at the University can be met with local clean energy. In addition, if the State's RPS is met with grid based renewable energy purchases, the amount of non-renewable energy consumption at the campuses will potentially decrease from current levels.

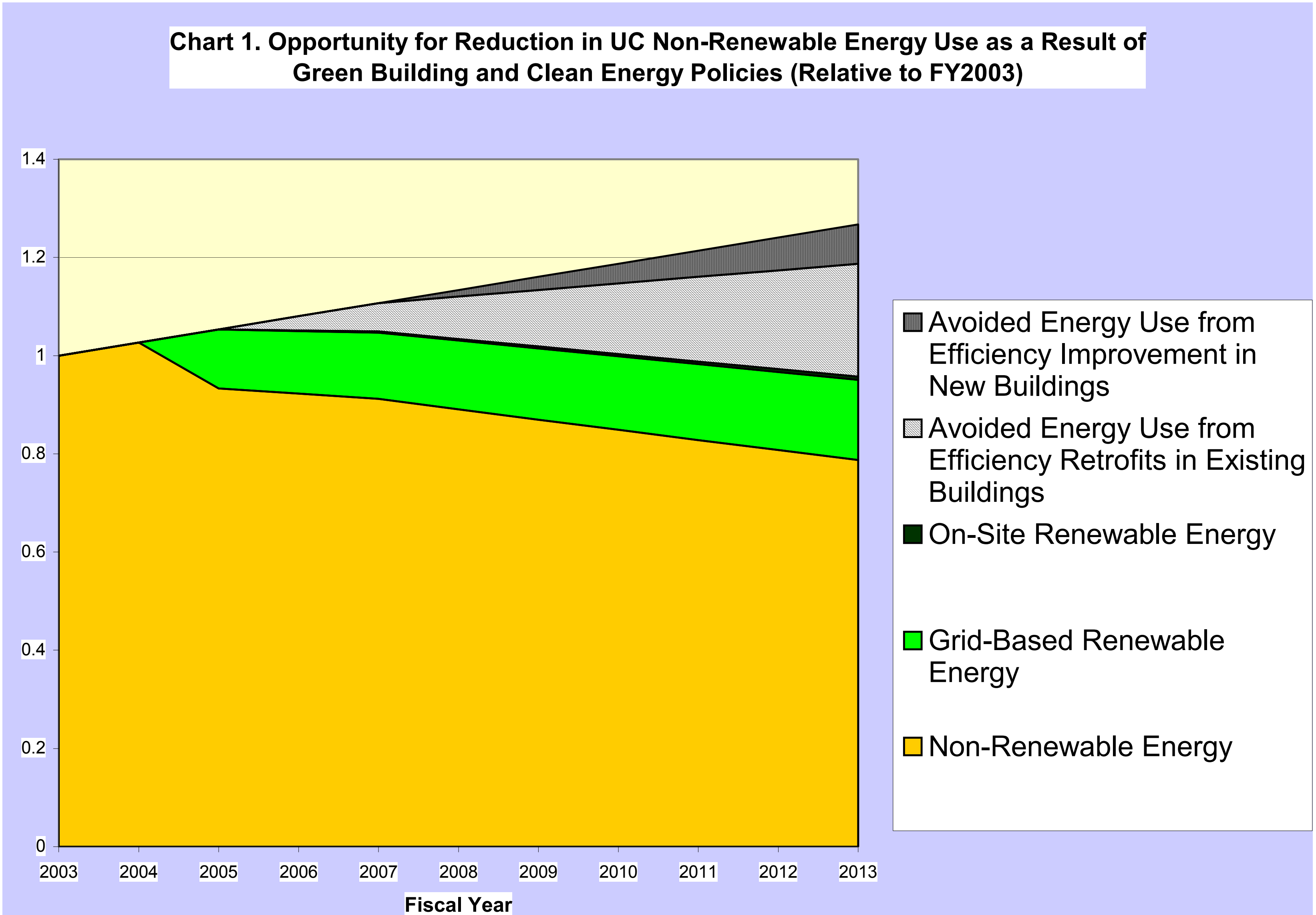


Chart 1. Opportunity for Reduction in UC Non-Renewable Energy Use as a Result of Green Building and Clean Energy Policies (Relative to FY2003)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Fiscal Year
Avoided Energy Use from Efficiency Improvement in New Buildings
Avoided Energy Use from Efficiency Retrofits in Existing Buildings
On-Site Renewable Energy
Grid-Based Renewable Energy
Non-Renewable Energy

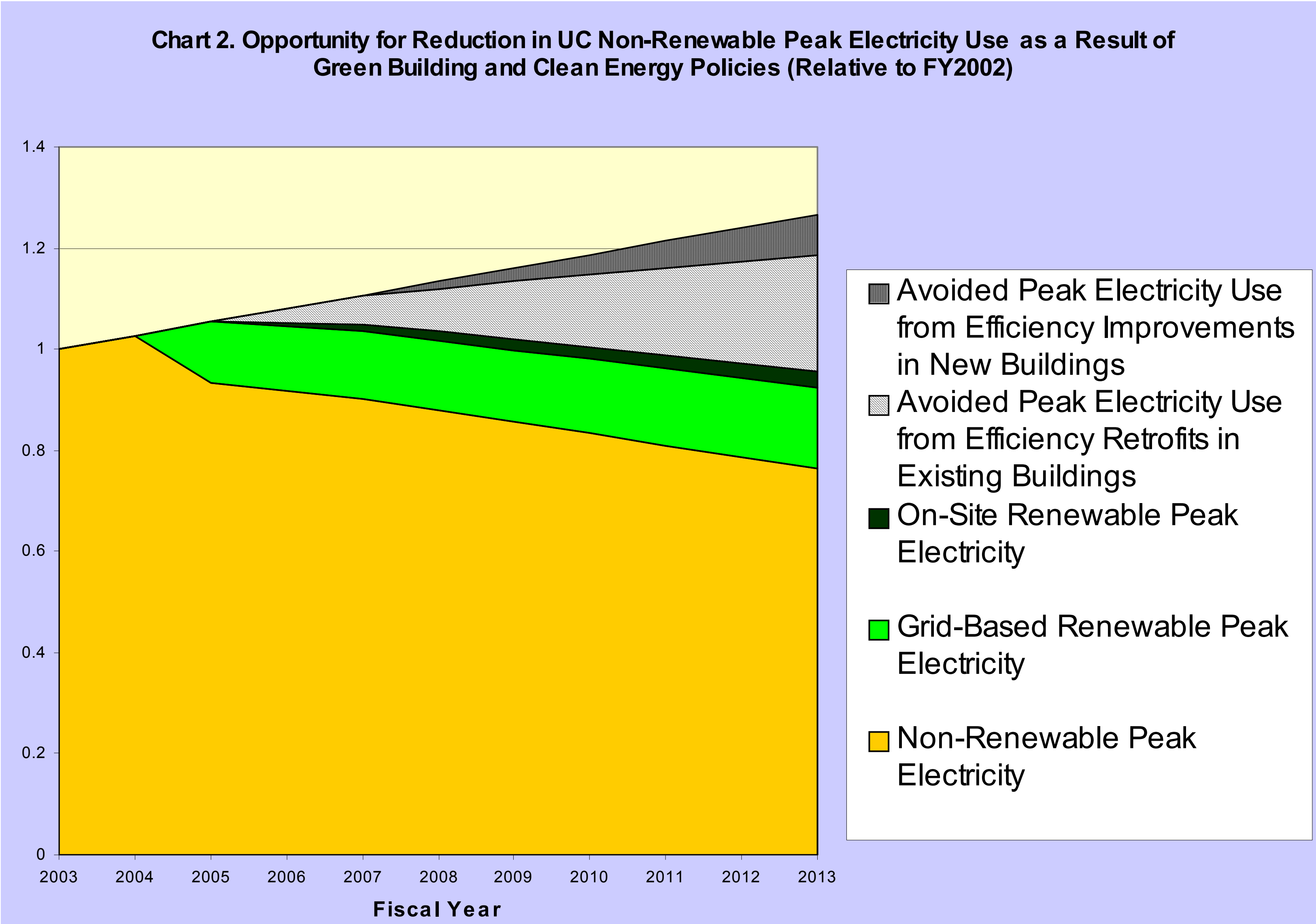


Chart 2. Opportunity for Reduction in UC Non-Renewable Peak Electricity Use as a Result of Green Building and Clean Energy Policies (Relative to FY2002)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Fiscal Year
Avoided Peak Electricity Use from Efficiency Improvements in New Buildings
Avoided Peak Electricity Use from Efficiency Retrofits in Existing Buildings
On-Site Renewable Peak Electricity
Grid-Based Renewable Peak Electricity
Non-Renewable Peak Electricity

II. Scope of this Study

The University is faced with several significant challenges regarding energy use as we move into the next 10 years of growth:

- How to meet campus energy needs with reliable energy service;
- How to manage the increasing cost of energy purchases; and
- How to minimize the resources required for and environmental impacts of campus growth.

In Academic Year 2002-2003, students at every University of California campus passed referenda requesting that the university develop policies for integrating sustainability into its energy purchasing practices and building guidelines. Underlying the student action was a two-fold concern about 1) the energy security of our country and 2) the environment.

Given the specific challenges set forth in the student request, this report was conceived to assess the feasibility of four proposed strategies:

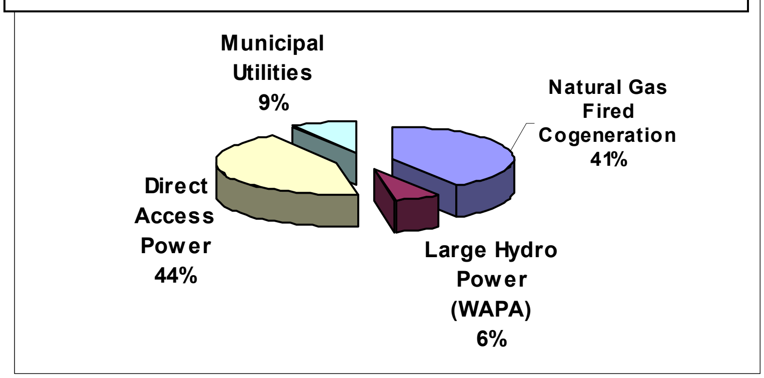
- The purchase of grid-based renewable energy;
- The installation of local renewable energy generation;
- Stepping up energy efficiency measures; and
- Other technologies with major environmental benefits

This study addresses these strategies within the context of the University's business and financial strategic plans and constraints.

III. Background

A. Current University Electricity Supply

Chart 3. Current University Electricity Supply by Type



Currently, the University obtains approximately 250 megawatts (MW) of peak electrical power to meet its core campus, state and non-state (e.g., student fee facilities) loads from a variety of sources as depicted by Chart 3. Total peak load including off campus University facilities is estimated to be approximately 300 MW (reference year 2000).

1. Direct Access Electricity Supply

In 1998, the University of California together with the California State University system entered into contracts to purchase direct access electricity from an outside supplier, rather than remain on utility bundled service. The University of California currently contracts for approximately 110 peak MW of power from Arizona Public Service Energy Services (APSES), a subsidiary of Pinnacle West (a Phoenix, Arizona company). The University of

California sites served under the contract are the San Diego, Irvine, Santa Barbara, Santa Cruz, San Francisco and Berkeley campuses as well as a small portion of the Davis campus.

According to APSES, the majority of electricity it supplies to the University comes from natural gas-fired generation plants located in California. The electricity contract with APSES runs through June 2003. The University is diligently working to arrange for an extension or a new direct access contract for FY 2003-04. However, due to regulatory uncertainty as to the future of direct access, it is not known whether the University will maintain direct access service to its campuses in the long term.

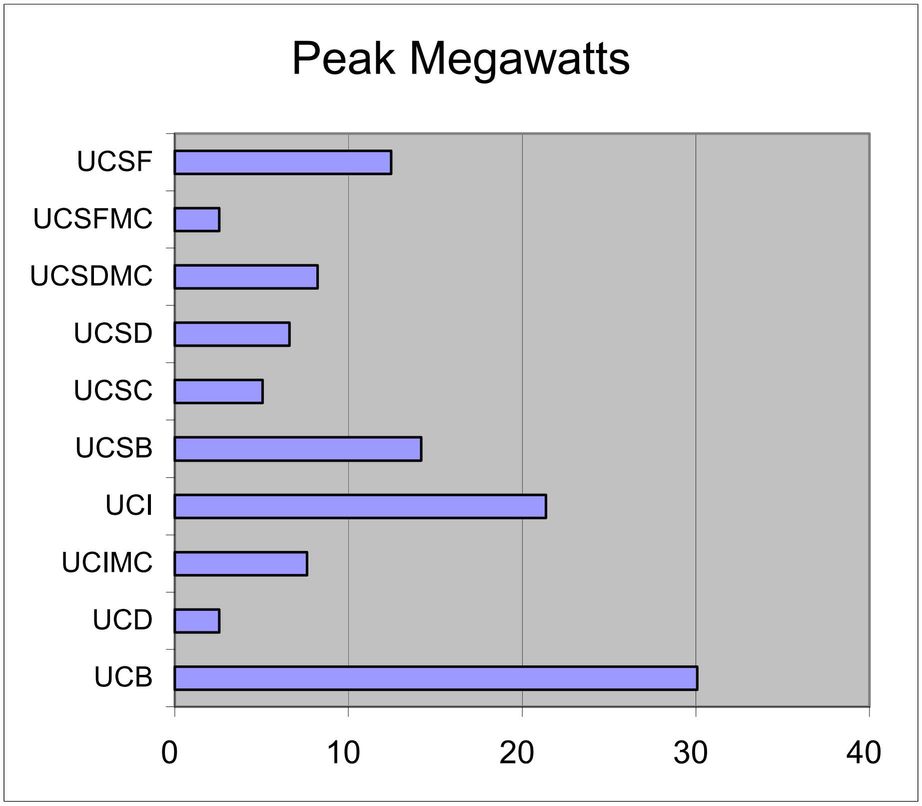


Chart 4. Peak Electrical Requirements at Seven Campuses and Three Medical Centers under the Direct Access Electricity Contract

Chart 4 indicates the peak electrical requirements at the seven campuses and three medical centers currently served under the University's direct access electricity contract.

Table 1.

2. Cogeneration Assets

The University has installed or purchased 138 megawatts of natural gas fired cogeneration at its campuses and medical centers since the 1980s. Cogeneration is an efficient electrical generating process wherein the heat from electrical generation is captured and put to use in providing steam to meet campus thermal needs. While cogeneration is not considered renewable energy, it makes efficient use of nonrenewable resources and provides tangible environmental benefits as compared to grid-based electrical supply.

The 25 MW plant at the Berkeley campus is owned by a third party and provides only steam to the campus. The Davis Medical Center plant also sells about 10 MW of its capacity to the grid. The total campus electrical load served by cogeneration is therefore approximately 103 MW, with the remaining 35 MW of capacity being supplied to the grid.

University Cogeneration Supply

University of California

Campus	Size in Megawatts
Berkeley	25
Davis	4
Davis Medical Center	25
Los Angeles	42
San Diego	26
San Francisco	13
Santa Cruz	3
Total Supply	138
Total UC Load	103
Reserve Capacity	35

Source: UC Office of the President, 2003

In his State of the State speech in January 2001, Governor Davis urged the University to take its electric load off the grid through cogeneration and other means. Several additional campuses are in the planning process for installing additional cogeneration capacity.

3. Other Electrical Supply Options

Two campuses, Los Angeles and Riverside, are located within the service territory of a municipal utility district (MUD) – the Los Angeles Department of Water and Power (LADWP) and the Riverside Municipal Utility District (RMU), respectively – and so contract for their electricity directly with those companies. In addition, the Davis campus contracts for approximately 15 MW of its electrical supply from the Western Area Power Authority (WAPA), which supplies hydroelectric power from large federally-owned projects.

Since the ability to add new accounts to direct access is currently suspended in California, all new buildings or campuses that the University brings on line that are not connected to an existing direct access account will be supplied through the local utility company. UCSF Mission Bay and the Merced campus fall into this category.

IV. Past and Present Campus Efforts at Clean Energy

Currently, grid-based renewables (electricity purchased from remote renewable generation sites) form a minor part of the University's energy portfolio, and there are a few examples of local renewable installations, such as solar photovoltaic energy, across the system. Two campuses, Los Angeles and Davis, utilize landfill gas to offset up to 10 percent of their campus gas needs. Except for cases where campuses receive renewable content from their local MUD, the vast majority of electricity currently consumed at the University has little renewable content.

The campuses have made a substantial investment in energy efficiency and load management over the last two decades, implementing the following projects:

- Building thermal energy storage units (which make chilled water at night when the demand on the grid is low) at the Riverside, Los Angeles, Davis, San Diego, Irvine and Merced campuses;
- Upgrading building lighting efficiency at the Los Angeles, Santa Barbara, Santa Cruz, Berkeley, San Francisco, Irvine, San Diego and Riverside campuses;
- Upgrading air compressor efficiency at the San Diego, Santa Cruz, Riverside and Los Angeles campuses;
- Improving stoplight energy efficiency (upgrades to LED light sources) at the Irvine campuses;
- Upgrading energy management control systems at the Riverside, Berkeley, Davis, Irvine, Los Angeles, San Diego, San Francisco, Santa Barbara and Santa Cruz campuses;
- Improving HVAC systems at the Santa Barbara, San Diego, Berkeley, Davis, Irvine, Los Angeles, Riverside, San Francisco, and Santa Cruz campuses;
- Initiating Strategic Energy Plans (fully or partially completed) at the Santa Barbara, Berkeley, Davis, Irvine and San Francisco campuses.

V. Grid-Based Renewable Electricity

The State of California instituted a Renewable Portfolio Standard in 2002 (see box next page for details); however, that standard does not immediately apply to providers of direct access electricity. Therefore, the University's direct access contract currently includes very little renewable content.

California Renewable Portfolio Standard (RPS)

In September 2002, Governor Davis signed a bill (SB 1078) requiring California to generate 20 percent of its electricity from renewable energy no later than 2017. The 20 percent standard is the most stringent renewables portfolio standard to date in the United States. The new law requires sellers of electricity at retail to increase their use of renewable energy by 1 percent per year. Since California already generates 10 percent of its electricity consumption by renewables, the new law will nearly double the state's existing base of renewable energy resources.

The RPS will apply to investor-owned utility customers, municipal utility customers, and in a few years, to energy service providers of direct access electricity. The legislation calls for the above market costs of renewable power to be covered through payments by the California Energy Commission's New Renewable Resources Account, an account funded through the public purposes fee applied to investor-owned utility and direct access customers throughout the State.

Three options are identified in this report for purchasing grid-based renewable energy: 1) opting for renewable energy in a utility's green marketing program; 2) buying renewable energy through a direct access contract; and 3) purchasing "green tags" or tradable renewable certificates, which represent the green attributes of renewable energy, unbundled from the underlying power. Following is an assessment of each of those options.

A. Opting for Renewables in a Utility's Green Marketing Program

This option is available to those campuses that contract for electricity with a local utility or MUD. For example, the Los Angeles Department of Water and Power, the Riverside Municipal Utility and the Sacramento Municipal Utility Districts (SMUD) all offer a green power alternative for their customers.

Los Angeles campus: The Green LA program offers green power at a cost premium of approximately 6 percent to its customers. The Green LA program supplies alternative green power to its customers through a combination of direct contracts with green power providers and "green tags" (renewable energy certificates; see section C below). UCLA participates in this program at one of its off campus facilities. The main UCLA account is served under a special negotiated rate with LADWP and does not include a special green power component. On this account alone, the cost premium would result in an increase of up to approximately $240,000 per year. For more information, see: http://www.greenla.com/.

Riverside campus: The City of Riverside Municipal Utility District (RMU) currently includes a 10 percent renewable power content in their portfolio. The RMU is developing solar energy power plants to increase the level of renewables in their supply portfolio. The Riverside campus receives this renewable content as a part of their contract with RMU. For more information, see: http://www.ci.riverside.ca.us/utilities/greenpower.stm.

Davis Medical Center: The Sacramento Municipal Utilities District offers a "Greenergy" green power purchasing program to its residential customers, but currently does not have a program for commercial customers. For more information, see: http://www.smud.org/green/index.html.

B. Buying Renewables Through a Direct Access Contract

This option would allow the University to contract directly with renewable energy generators (e.g., wind farm operators) for their power. By doing so, the University could lock in renewably generated power at a fixed price and conceivably save money if gas-generated electricity prices surpassed wind energy prices.

However, as discussed in the background section of this report, the future of direct access electricity service is uncertain. For this reason, the University is not currently able to enter into a long-term direct access contract that would enable direct energy supply contracts with renewable producers. The University will explore short-term renewable power options with its direct access service provider.

C. Buying "Green Tags"

A final option for purchasing grid-based renewable energy would be to purchase tradable renewable certificates, or "green tags". Green tags represent the green attributes associated with electricity generation from recently installed renewable capacity. Green tags are generated when the owner of, for example, a wind farm, sells separately the electrons generated by the wind farm and the green attributes associated with those electrons. Green tags were introduced to allow consumers to help offset the higher cost of installing renewable capacity over non-renewable capacity. According to the Center for Resource Solutions (CRS), a non-profit renewable energy consumer advocacy organization, "[CRS certified] Renewable Energy Certificates (or "green tags") are created when a renewable energy facility generates electricity. Each unique certificate represents the environmental benefits of 100 percent new renewable generation and is sold separately from the electricity. When you buy renewable energy certificates from new renewables, you buy the benefit of displacing non-renewable sources from the regional or national electric grid." [2]

As detailed in Appendix A, green tags have been purchased by at least 39 other universities in the U.S. and are generally considered an efficient mechanism for subsidizing the cost premium associated with building renewable energy resources. In fact, in 2002 the University's direct access supplier, APSES, procured green tags on behalf of the Bren School at the Santa Barbara campus to achieve its "Platinum" LEED rating.

There is evidence that the green tag market is spurring the development of new renewable power sources elsewhere in the country. The aggressive sale of green tags in Pennsylvania, for example, has resulted in the creation of one of the country's fastest-growing wind energy markets. According to researchers at the National Renewable Energy Laboratory, "The availability of wind energy certificates in Pennsylvania's retail electricity market has led directly to the development of 140 MW of new wind energy projects in the region."[3]

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[2] From "Why Choose Green Electricity" brochure, Center for Resource Solutions, Presidio Building 97, San Francisco, California 94129 www.green-e.org

A survey of universities nationwide cited the following benefits of their decision to purchase clean energy:

- Good public relations for the school: newspaper articles and awards for school
- Follow-on green tag purchases from peer universities
- Student enthusiasm
- Recognition by the community

The disadvantage of buying green tags is the fact that there is no direct economic advantage to the University. Schools that buy green tags must continue to contract separately for their electricity needs, which means that as long as they buy green tags, they will have to pay a premium for green energy and there is no protection from fluctuations in the price of fossil fuel generated electricity. Unlike energy efficiency, buying green tags results in a net increase in energy costs. Also, unlike local renewable systems, green tags do not directly contribute to the diversity of campus energy supplies.

1. The Economics of Green Tag Purchases

A green tag can be purchased for an account regardless of its status as direct access or utility bundled service. Green tag costs range between 0.5 cents and 2 cents per kWh, depending on the source of the tag (e.g. wind, biomass or solar) and the location of the renewable resource. Given the approximately 600,000,000 kWh of electricity UC currently purchases under its direct access contract, costs for purchasing green tags would be as follows:

Table 2. UC Direct Access Load Green Tag Annual Cost at Various Price Points

Percent Renewable Content	Annual Cost at 0.5 cents per kWh	Annual Cost at 1.0 cent per kWh	Annual Cost at 1.5 cents per kWh	Annual Cost at 2.0 cents per kWh
5%	$ 150,000	$ 300,000	$ 450,000	$ 600,000
10%	$ 300,000	$ 600,000	$ 900,000	$1,200,000
15%	$ 450,000	$ 900,000	$1,350,000	$1,800,000
20%	$ 600,000	$1,200,000	$1,800,000	$2,400,000
25%	$ 750,000	$1,500,000	$2,250,000	$3,000,000

The best information available at publication time is that green tags for UC would fall in the 1-cent per kWh range, therefore costing an additional $600,000 per year to meet a 10 percent renewable content goal in the near future.

2. Funding Sources for Grid-Based Renewable Resources

Given current budgetary problems, there is no identified source of system-wide funding for these premium costs. The most likely scenario is that each campus would be responsible for paying the increased cost of purchasing green energy from its own sources. Currently, campus

[3] From "A Certificate-Based Approach to Marketing Green Power and Constructing New Wind Energy Facilities," by Eric Blank (Community Energy), Lori Bird (NREL) and Blair Swezey (NREL)

Operation and Maintenance of Plant budgets, as well as operating budgets for auxiliaries and medical centers, are already under-funded.

An alternative funding scenario would be to follow the leads of Michigan State University and the University of Colorado, who funded their clean energy purchases through student fee referenda. As illustrated in Table 3 below, each UC campus has student-enacted earmarked fees.

Table 3. FY02/03 Associated Students Fees

Associated Students Fees	Undergraduate $ Per Year	Graduate $ Per Year
Berkeley	$55	$55
Davis	$105	$19
Irvine	$54	$27
Los Angeles	$72	$30
Riverside	$47	$54
San Diego	$63	$36
San Francisco	(no undergraduate students)	$33
Santa Barbara	$80	$28
Santa Cruz	$36	$30

Following the Michigan and Colorado model, Associated Students fees could be designated through voter referenda for use for green energy purchases.

VI. Local Renewables

As a component of supplying campus electrical needs, this feasibility study addresses the types of local renewable electricity currently available.

A. Types of Local Renewable Resources Appropriate for the University

1. Wind

To create wind generated electricity, turbines must be located in a place of steady wind resources, such as the Tehachapis, the Altamont Pass or the Palm Springs area. None of the campuses are well located to harvest wind energy. It is possible that some off-campus property may be better sited, and that the University could work to develop a wind generation project that fed electricity into the grid on behalf of campuses. The drawback of remote wind generation facilities is that the power output from these facilities could not be directly transmitted to a campus, but would have to be sold wholesale to a third party who would then be responsible for serving campus loads.

2. Geothermal

Geothermal generation takes advantage of naturally-occurring heated groundwater to run electricity generators. A good example of this is the Geyser plant located near the Napa Valley, an area of plentiful geothermal resources. No UC campus is located near a significant geothermal resource. There may be small opportunities at campuses, but this renewable resource has a low probability of providing significant energy for UC campus use. Ground source heat pumps are often referred to as "geothermal" but are in the category of energy efficiency, not renewable power.

3. Biomass

Biomass energy plants utilize organic waste products which can be processed to provide fuel for electrical generation. The Davis campus is studying the economic and practical feasibility of siting an approximately 1 MW biomass project at its campus. Other modest biomass opportunities may exist at other non-urban campuses. It is not anticipated that on-campus biomass projects will provide significant amounts of energy for campus use.

4. Small scale hydroelectric generation

The Merced campus is studying the economic feasibility of purchasing the output of a 1 MW hydroelectric project currently located in an irrigation canal running through the campus property. No other small hydroelectric projects have been currently identified at other campuses. It is not anticipated that small scale hydroelectric generation will provide significant energy for campus use

5. Solar Photovoltaic Energy

Solar photovoltaic (PV) panels utilize materials that produce electric current when struck by light energy. This technology represents the best opportunity for local renewable generation at the University. Solar PV panels could likely be sited on flat roofs on campus buildings and as covers for parking lots without requiring changes to campus long range development plans (LRDP). Placing panels in other visible locations would likely trigger architectural review at minimum, and possibly require changes to campus LRDPs. Still, there are fairly significant siting opportunities for solar PV at campuses.

B. Economics of Recent Public Sector Solar Photovoltaic Energy Projects in the State of California

Table 4 summarizes data from recently installed, planned, or evaluated solar PV energy projects in the State of California by public entities. Further detail on the projects may be found in Appendix B. The list of projects included is not intended to be comprehensive, but rather a representative cross section of project types and costs being installed, planned, or considered for University or other public sector buildings.

Table 4. An Economic Analysis of Recent California Public Sector PV Projects

Project Site	Project Size (kW)	Total Cost	Total Subsidies	Source of Subsidies	Gross (Net) $/kW	Gross (Net) Simple Payback (yrs)
Sacramento – Franchise Tax Board	469	$2,822,000	$1,360,000	Sacramento Municipal Utility District	$6017 ($3,075)	35 (18)
UC Merced Carport Structure	125	$ 760,000	$ 380,000	CPUC Renewable Buydown	$6,080 ($3,040)	32 (16)
Sonoma State University – Salazar Bldg	96	$ 680,400	$446,500 (portion > 50% is not a PV subsidy, but funding decision by SSU)	CPUC Renewable Buydown, PG&E Savings by Design	$7,088) ($2,430)	35 (12)
CSU Northridge - Carport Structure	225	$1,800,000	$1,665,000 (unique subsidy in this area)	LADWP & So, Calif. Gas Co.	$8,000 ($600)	36 (3)
CSU Hayward – Four campus buildings	1124	$7,000,000	$3,500,000	CPUC Renewable Buydown	$6,228 ($3,114)	34 (17)
San Francisco Moscone Ctr. Solar Project	675	$4,200,000	$2,100,000	CPUC Renewable Buydown	$6,222 ($3,111)	42 (21)
City of San Francisco Moscone Center – Solar Plus Energy Efficiency Project	Not Available	$7,400,000	$2,275,000	CPUC Renewable Buydown, PG&E Energy Efficiency incentives	Not Available	42 (8) This includes avoided cost from energy efficiency
Loyola Marymount University	650	$4,350,000	$4,025,000 (unique subsidy in this area)	LADWP & Southern Calif. Gas Co.	$6692 ($500)	36 (3)

Additionally, the following small solar PV energy pilot projects have been installed or are in the planning phase at the following campuses:

Santa Barbara – 42 kW on Bren Hall
Riverside – 20 kW parking lot shading
Berkeley – 125 kW on Associated Students building

In the case of the Santa Barbara and Riverside projects, much of the cost of the PV energy systems was offset by equipment donation.

Based on the above data in Table 4 and other projects listed in Appendix B, it appears that the range of PV energy costs before rebates is $6,000 to $8,000 per installed kW with a payback of 30 to 42 years. The current CPUC buy-down program will cut the cost in half, bringing the simple payback into the 15 to 21 year range. Extended warranties are available for PV equipment for up to a 25 year period. The expected module life is 30 to 35 years.

To further enhance the economics of PV energy development, other institutions have relied on additional funding opportunities in order to lower costs to levels that can be financed. The City of San Francisco has elected to package the solar photovoltaic project for the Moscone Center with an aggressive energy efficiency retrofit, enabling the savings from the energy efficiency project to subsidize the cost of the PV project. Sonoma State University has chosen to allocate the energy efficiency incentive received by the Salazar building project towards the cost of solar PV energy panels for the building.

The other variable in determining a solar project's payback besides first cost is the avoided cost of electricity the building would have to pay absent the solar project. UC campuses typically pay both an energy charge and a demand charge for power delivered to their site. All of the three major investor-owned utilities assess peak demand charges in the summer for afternoon hours up until 6 p.m. In response, many campuses have installed thermal energy storage projects to reduce on-peak loads. In order for a PV project to provide demand charge savings for a campus, additional peak demand must be shaved. Load profiles at the campuses with central thermal energy storage plants are relatively flat through the on-peak hours. Solar arrays cannot provide steady demand reduction through 6pm, when peak demand charges are typically still applicable (PG&E rate schedule). So the avoided cost of electricity attributable to a solar PV energy array is somewhat lower than the full energy and demand charges that might be avoided by a site with a load that better matches PV output. This has the effect of lessening the attractiveness of the solar project by increasing the number of years until the project reaches its payback point.

C. Developing a Strategic Plan for Local Renewable Energy Systems

A discussion of opportunities for local renewable energy systems should include:

- the availability of local resources,
- available subsidies

- economic viability constraints,
- project characteristics necessary for economic viability, and
- the scale of new construction anticipated in the next decade

1. The Availability of Local Resources

Section VI.A.,"Types of Local Renewable Resources Appropriate for the University," details approximately 2 MW of biomass and (existing) small hydroelectric resources available at certain campuses. These are unique resources not expected to be replicable system wide. Significant solar energy is available at virtually all UC campuses, with solar photovoltaic energy being the dominant generation system in any potential local portfolio. Solar thermal installations are also feasible, but the relatively small thermal loads make the potential for development an order of magnitude smaller than for photovoltaic electricity generation.

The feasibility and economics of solar photovoltaic generation will largely determine the general size of the goal for local renewable energy systems. Once the general size of the goal is established, all forms of economically feasible local renewable energy can be pursued toward meeting the goal.

2. Available Subsidies

Summarizing from Appendix C, the limits on CPUC statewide subsidies are as follows:

- 50 percent of total project cost.
- $4.50 per watt in 2002
- 1MW per system per year for each of four investor-owned utility (IOU) service areas (PG&E, SCE, SCG, SDG&E)
- 4 MW total for each of four IOU service areas over the life of the current program (if the program is extended it remains to be determined if the 4 MW per service territory limit will be for the life of the program or will go to 1 MW per year per service territory)

Independent subsidies from LADWP, Riverside Municipal, and SMUD will also play into the mix of available subsidies, but are specific to the Los Angeles and Riverside campuses and the UC Davis Medical Center, respectively.

Other subsidies will occasionally be available on a limited basis, but for the purpose of system wide goal setting, CPUC subsidies are the key consideration.

3. Economic Viability of Photovoltaic Energy Systems

Energy development scenarios must be at least economically neutral for the University. It is not prudent for the University to invest in significant amounts of generation capacity that create negative cash flow with respect to the baseline energy costs.

From data in Table 4 and Appendix B, the unsubsidized simple payback period for actual current PV energy projects is 30 to 42 years. With some exceptions for unique circumstances, the available PV energy subsidy is 50 percent, bringing the subsidized (net) simple payback period to 15 to 21 years.

For photovoltaic systems to be economically viable, debt service should not exceed the avoided cost of the electricity. These projects should assume favorable financing scenario (e.g. 5.5 percent for 15 years), and meet corresponding simple payback limits of approximately 7-8 years. At the payback limit, the cost of the generated electricity (including financing costs) equals 75 percent of the cost of the electricity that would have been purchased otherwise from the campuses electricity provider.

Our analysis avoids the common assumption of high electricity rate escalation. Such an assumption allows poorer performing PV systems to be financed, with negative cash flow in the early years of the project. Assuming high electricity rate escalation is not appropriate for two reasons. One is that UC has no mechanism to absorb the negative cash flow in the early years of the project. The other is that current electricity rates are already quite high due to the need to payoff large costs incurred during the energy crisis.

One conclusion is that the subsidy is necessary for economic viability. Another conclusion is that University financing criteria can only be met by packaging solar PV projects with substantial energy efficiency projects, identifying other funding sources, and/or including PV which meets similar financial criteria in new construction projects eligible for 30-year financing.

<u>PV Project Energy Characteristics Necessary for Economic Viability</u>

- Flat Roofs with Relatively Few Obstructions. Integrated PV roofing systems (e.g., Powerlight Power Guard ™) have the lowest first cost. This factor is more important than the lower power output of the level PV surface. Such a low cost integrated roofing system currently exists for flat-roofed structures. The system can be built around minor roof obstructions. While a system is coming on the market for slightly sloped roofs, it does not have the proven track record of the flat roof system.

- Minimized Voltage Transformation and Line Losses. The net output of PV systems is seriously compromised by either the necessity for voltage transformation to 12 kV for campus distribution levels, or by long distribution runs at lower voltage (e.g. 480 V). The most cost effective projects will be either located on top of buildings or close to buildings or other facilities that can use all of the PV power.

- High Peak Electricity Rates. The cash flow and payback period of PV energy projects is improved by high electricity rates that a campus would otherwise have to pay its electricity provider. The campuses often enjoy relatively low electricity prices, because of the size of the campus service and because the campus often owns and operates its own voltage transformation and distribution facilities. Large service rate schedules (e.g.; E-20 in the PG&E service territory) have lower electricity rates. Transmission or primary service options (e.g.; E-20T in the PG&E service territory) also provide lower rates to customers that take service at higher voltage levels. Some facilities remote from the main campus have separate smaller services. The best scenario for developing PV energy economically is a medium sized facility that is large enough to be served under time-of use rates (generally favorable to PV), but not big enough to capture the discounts for very large or high voltage electrical service.

- Ability to Capture Avoided Demand Charges. Most UC facilities are under rate schedules that include demand charges in addition to energy (kWh) charges. As much as one third of the avoided electricity costs for PV appear in demand charges. As noted in Section VI.B., the ability to capture demand charges depends on the electricity load profile of the facility. As PV energy is added to a facility, the ability to capture demand charges will eventually be reduced and eliminated, making subsequent PV energy installation less economically viable.

In general, some combination of the above circumstances will usually be necessary to develop an economically viable PV installation.

5. Scale of New Construction in the Next Decade

Over the period 2001 to 2005, new buildings or building augmentations are estimated at approximately 2 million gross square feet per year. The laboratory buildings portion of this growth is estimated at approximately 50 percent. The following analysis assumes that the same rate of new construction will continue through 2013.

D. Analysis of Student Request for Local Renewable Energy

The students have requested that the University provide 25 percent of the peak power demand of new buildings from renewable energy. The following analysis uses PV systems as a proxy for all local renewable energy. If other renewable energy projects prove viable and economically feasible, they can be substituted for PV energy in meeting the goal.

Two scenarios are presented. The Business-as-Usual scenario assumes that new construction energy intensity will be reduced by 15 percent from FY2000 benchmark levels (following already implemented and further anticipated improvements in California Title 24 Energy Standards). The Efficiency Scenario assumes that energy intensity of new buildings will be reduced by 50 percent from FY2000 benchmark levels starting with buildings opening in FY2008.

Table 5. Feasibility of PV Energy in Meeting Local Renewable Energy Goals

	Business as Usual (Title 24)	Efficiency Scenario
Estimated New Peak Power Demand[4]	61 MW	42 MW
Student Request: 25% of New Peak Power Demand from PV	16 MW	11 MW
PV Area @ 10 W/sf	1.6 million square feet	1.1 million square feet
Fraction of system wide roof area required (FY2013)	5 %	3 %
Unsubsidized Cost @ $6.50 /Watt	$104 million	$72 million
50% Subsidy	$52 million	$36 million
Original Portion of 4 Year CPUC Subsidy Program Allocated to PV	$133 million	$133 million
Net Cost to be Financed or Funded	$52 million	$36 million

The student request leads to the conclusion that the University would install 11 MW of PV systems to meet 25 percent of the peak load of new campus buildings built to aggressive energy efficiency standards. These systems would require an area of approximately 1.1 million square feet, which would take up 3-5 percent of the total system wide roof area in 2013. This appears to be a viable fraction of roof area to use for PV given aesthetic constraints and the need for unobstructed flat roof area for the most economic PV installation.

It is anticipated that demand charge savings would be available for this part of the peak load on many campuses, helping the economic viability of this level of installation.

The unsubsidized cost for 11 MW of PV projects would be approximately $72 million, with the need for at least 50 percent or $36 million to be available from subsidy programs. The total original amount allocated to PV energy in the current (2001-2004) statewide CPUC subsidy program is $44 million per year for three years or a total of $133 million.

For purposes of this program the University is considered to be one corporate entity and as such is limited to 1 MW of incentive per year in each of the four utility service territories in the

[4] These figures are developed assuming the addition of approximately 2,000,000gsf per year of new space systemwide over the next decade. Although building development plans have not been set for the latter part of the decade, these peak load figures are indicative of loads likely to develop systemwide in that time period.

State. This would lead to the conclusion that the University could qualify for subsidies for up to 12 MW of PV energy installations in the next three years. However it is highly unlikely that the University could develop this magnitude of solar PV energy projects on this expedited timeline. For the student requested scenario to be viable the IOU-administered CPUC Self-Generation Incentive Program (or equivalent) must therefore be extended beyond its current sunset of 2004 with equivalent availability of funds.

Up to $36 million of net PV energy system cost would remain to be financed or otherwise funded to be able to implement the students' request. This amount cannot be financed by relying on the cost savings from the PV generated electricity in the nominal 15-year (5.5 percent) debt scenario. Additional subsidies, additional funding sources, or combination with energy efficiency projects will be necessary in most cases. For example, a student fee increase of approximately $6 per quarter over the next 10 years would cover the majority of this investment.

E. Financing and Funding Options for PV Energy Projects

Types of Facilities

Two fund sources--State and non-State--are available for funding facilities on campuses. . Examples of non-state-funded facilities are student unions, student housing and recreation centers. The financing mechanisms available under each of these funding sources are very different.

State Supported Facilities

For funding PV energy projects on state funded facilities there are two main financing mechanisms that the University might take advantage of: tax exempt financing or third party financing.

Under tax exempt financing, the University could potentially utilize its own bond financing, or financing provided through another tax-exempt entity such as the California Power Authority.

To utilize its own bond financing capabilities, the University would follow a procedure known as a Section 28 waiver,[5] a mechanism that allows project purchased utility savings to be used for debt service for eligible capital projects. Typically, a Section 28 waiver-financed energy project would need to have a simple payback of 7-8 years or less to qualify for this financing option. Since the paybacks of even the best PV installations are likely to exceed this criterion, PV energy projects would have to be packaged with shorter payback energy efficiency projects or would have to secure additional funding through grants or student contributions.

In a typical third-party financing scenario, the University would lease space to a third party who would then install PV energy equipment and sell the output to the campus under an energy

[5] A provision under 6440-001-0001 in the State Budget Act states that no operating funds can be expended to initiate major capital outlay projects without prior legislative approval "…except for cogeneration and energy conservation projects. Exempted project shall be reported in a manner consistent with the reporting procedures in subdivision (d) of Section 28.00 of this Act."

services agreement. The chief advantage of this approach is that the third party could take advantage of federal and state tax credits that that UC could not. However, according to the University's consultant HMH Resources, third party financing is typically up to 20 percent more expensive than tax exempt financing for solar photovoltaic energy projects. This could change over time as federal and state tax laws change. See Appendix D for additional discussion on this topic.

Non-State funded Facilities

For new housing facilities, solar PV energy projects could be incorporated into the overall housing finance package typically comprising 30-year bonds. Rental income would have to be able to support the extra cost of the PV units for the package to be viable. This longer bond financing scenario would lend itself well to the financing of PV energy projects if economic hurdles could be met. Recently, Berkeley students voted to use $100,000 per year (graduate and undergraduate Associated Student fees) for 3 years to pay for 55 kW of photovoltaic panels to be installed on their student union building. It is anticipated that an additional 55kW will be installed in a second phase. For student fee supported facilities, students might vote through a campus referendum to increase their annual fees to finance a solar PV project or, as in the case of the Berkeley campus Martin Luther King Hall project, to redirect existing fees to this purpose.

F. Energy Efficiency

The University recognizes that the cleanest energy of all is the energy that is not consumed. Thus, energy efficiency and other means of conserving energy resources are the best clean energy policy. The University has demonstrated a commitment to clean energy by investing over $100 million in energy efficiency at its campuses beginning in the 1980s. In looking to the future, the University will continue efforts to maximize the energy efficiency of campuses for both environmental and fiscal reasons.

Energy efficiency improvements to existing buildings will provide campuses with a powerful tool to minimize consumption of non-renewable energy over the next decade. Not only will energy efficiency programs provide extensive environmental benefits, they will play a major role in controlling purchased utility costs thus providing economic benefit to all campuses.

The State Department of Finance provides funding for state-eligible space at the campuses, on a $/square foot basis for Operation and Maintenance of Plant, (more specifically, purchased utilities). The $/square foot was based on energy prices in the early 1990s and has escalated annually by zero to 5 percent. Since then, Investor Owned Utility and Direct Access electricity prices have almost doubled in response to the State's 2001 energy crisis. Gas unit prices are also considerably higher than pre-energy-crisis prices. In addition, purchased utility funding does not take into account the large difference in energy consumption between complex (e.g., laboratory and hospital) space and non-complex (e.g., classroom and office) space.

Based on current building construction practices, Business-as-Usual (BAU) system-wide energy operating costs for FY2013 are anticipated to be almost double the BAU budget for

FY2013. The deficit is due to energy price increases and the high fraction of laboratory buildings in the new construction portfolio.

In 1999-2000, a number of campuses undertook a strategic energy planning (SEP) process as a part of the University's then-current direct access energy contract. The chart below represents the findings of the UC Santa Barbara campus Strategic Energy Plan.

- Strategy 1: Energy Efficiency in New Construction (incl.design & construction standards)
- Strategy 2: Deferred Maintenance (targeted at energy systems)
- Strategy 3: Facility Renewal (targeted at energy including standards)
- Strategy 4: Energy (Retrofit) Projects
- Strategy 5: "Energy Management Plan" (information systems including monitoring)

From Chart 5, it is evident that implementing energy efficiency in new construction (the study assumed new buildings would exceed Title 24 standards by 20 percent) can have a significant impact on overall future energy consumption. But to successfully implement a goal of no increase in the use of non-renewable energy on the University's built environment, additional energy efficiency measures will need to be undertaken, in conjunction with renewable energy projects or purchases.

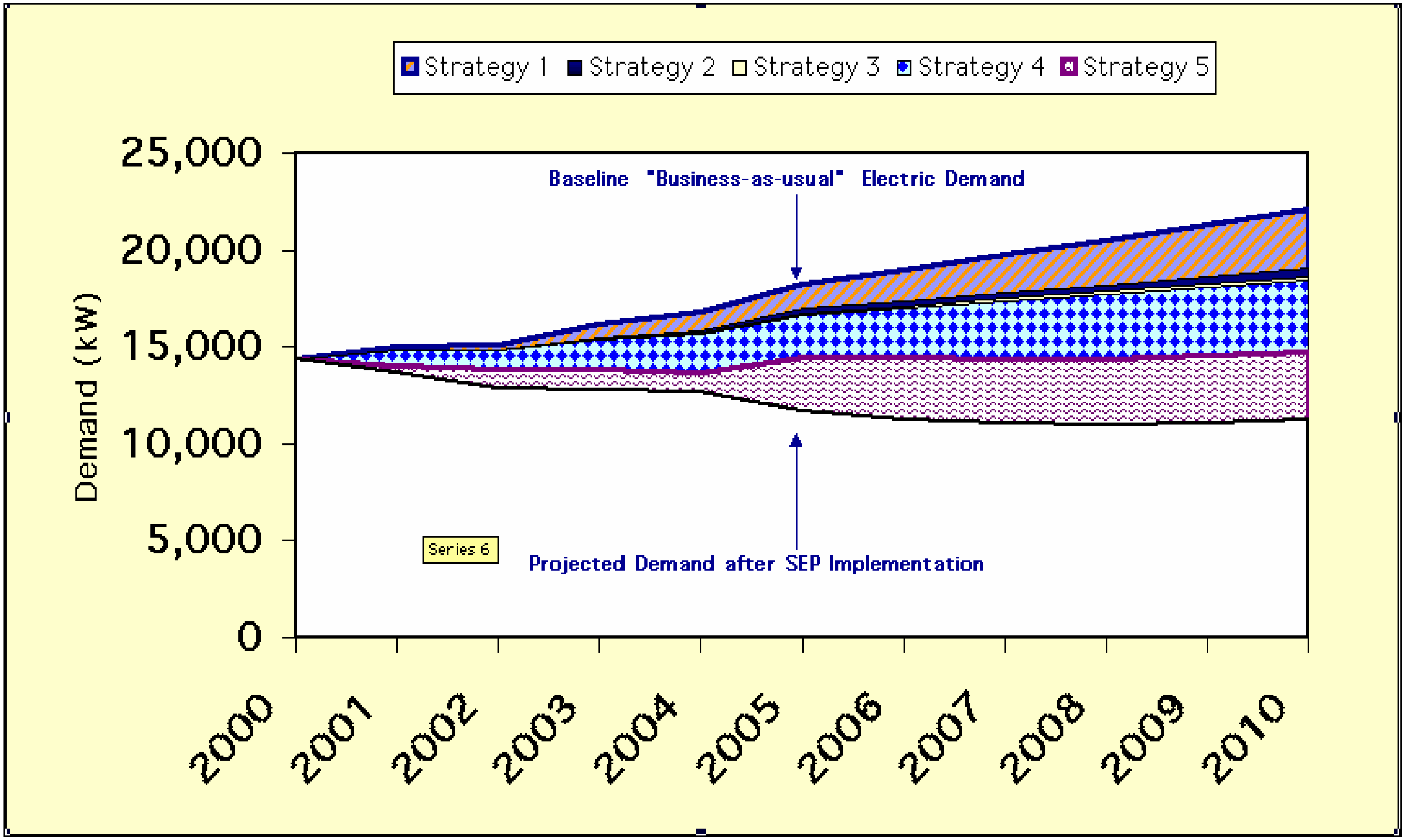
Table 6 summarizes energy efficiency retrofit projects identified by surveys conducted for the campus Strategic Energy Plans. The Santa Barbara (pilot), Berkeley, Irvine, San Diego, and Davis campuses are included. Information from other campuses is pending. The totals for each campus include most projects from the Retrofit "Energy Projects" category, and appropriate (efficiency) projects from the "Energy Management Plan" category." A few "Facility Renewal" or "Deferred Maintenance" projects are included if the project analysis shows that it is economically justified solely on the basis of energy savings (on the same basis as the retrofit projects) rather than on maintenance or avoided capital savings.

Table 6. Summary of Strategic Plan Findings to Date

Campus	Surveyed Floor Area million gsf)	Total Identified Project Costs ($ million)	Total Annual Electric Savings (MWh)	Total Annual Gas Savings (therms)	Total Annual Energy Cost Savings ($ million)[6]	Identified Project Simple Payback
UCSB	5.0	$12.6	29,200	953,128	$2.8	4.5
UCB	8.-0	$20.5	20,452	3,797,663	$4.0	5.1
UCI	3.5	$10.3	12,448	467,720	$1.5	6.9
UCSD	5.0	$40.9	51,187	2,979,245	$7.6	5.4
UCD	4.6	$11.8	11,317	1,701,654	$2.2	5.3
Totals	26.1	$96.1	124,604	9,899,430	$18.1	5.2

[6] Capital cost data based on FY 1999/2000 costs.

Chart 5


Strategy 1
Strategy 2
Strategy 3
Strategy 4
Strategy 5
Demand (kW)
25,000
20,000
15,000
10,000
5,000
0
Baseline "Business-as-usual" Electric Demand
Series 6
Projected Demand after SEP Implementation
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010

Variations between campuses are indicative of several factors including differing energy unit prices, previously accomplished energy efficiency and rigor of the strategic energy plan engineering effort. It is important to note that the surveys often included only a portion of the campus facilities, which are reflected in the costs and savings columns in Table 6, above. Energy prices in the table have been adjusted upward to be generally near, but not all the way up to, post-energy-crisis levels. Despite the eventual refinement of the energy price information, the results of the surveys were often limited based on perceptions of savings available with pre-crisis energy prices.

Using the information in Table 6, we produced an average total energy savings potential per square foot of floor area surveyed of $0.69/gsf. This availability of savings is applicable to Investor Owned Utility (IOU)-served campuses with high energy prices.

Un-surveyed Facilities at SEP Campuses

Additional available savings were extrapolated for un-surveyed facilities within the main utility accounts at the five campuses utilizing average square-foot savings and cost figures from the surveyed portions of the campuses. The key assumption was that the level of potential savings would be the same for the un-surveyed facilities, but that the payback period would generally be longer (averaging eight years). The average simple payback for the whole campus was thus projected to be higher than for the surveyed facilities, but still within the range that could be financed. The projected annual cost savings for the un-surveyed portions of the campuses presented in Table 6 was $9.6 million at an investment of $77 million. See Appendix E for further information.

System-Wide Retrofit Potential

To estimate savings for those campuses that have not yet completed a strategic energy plan, average cost and savings information was extrapolated to all other IOU-served campuses. The savings potential is assumed to be lower, corresponding to lower electricity prices at the municipal utility-served campuses. The additional annual energy cost saving potential for un-surveyed campuses is projected to be $26 million at an investment of $161 million.

Total annual energy cost saving potential (gross before financing) across the University system is projected to be $54 million. A cost of $335 million to retrofit all system-wide projects up to an average simple payback of 6.2 years. See Appendix E for further detail.

Based on information from existing Strategic Energy Plans, the average system-wide retrofit potential is approximately 27 percent of base year 2000 consumption with an average simple payback period within the 7-8 year limit for financing. The estimates of total system wide energy use are based on a benchmark model that reconciles with the campus energy use estimates in the five SEPs.

Adding contingency to the identified project costs, a conservative statement of the system-wide efficiency potential is then a savings of 25 percent of energy use within the 7-8 year simple payback limit for financing, with financing requirements of up to $400 million.

The results of the Strategic Energy planning process point to the fact that, by implementing cost-effective energy efficiency projects, campuses can still make strides towards the goal of carrying out growth plans without corresponding increases in the use of non-renewable energy. A substantial amount of the remaining energy efficiency retrofit opportunity has emerged with the recent substantial increases in energy prices.

VIII. Findings

University of California students have presented us with a unique opportunity to update our energy future. The University can move toward increased energy independence and resource diversification by developing its clean energy resources. Drawing on the basic principles of portfolio theory, the University will significantly reduce its risk exposure if it diversifies its energy resource portfolio.

In addition to securing its energy future, the University has an opportunity to demonstrate leadership on energy efficiency issues and to exemplify wise stewardship of the environment. Such leadership is likely to result in respect from peer institutions and community members, and engender pride among students and alumni.

The Findings of this feasibility study are summarized as follows:

A. Campus Energy Load Increases

To meet projected enrollment growth, the University system is expected to add approximately 2,000,000 additional gross square feet of new building space each year for the next 10 years. If this level of development continues over the next decade, it is anticipated that utility costs will double compared to the base year of 2000. It is also anticipated that 42 MW of new electrical demand on the California grid will be created by this growth even if aggressive energy efficiency designs are incorporated into the new facilities.

B. Energy Efficiency

It is estimated that energy efficiency retrofits can result in an average system- wide energy reduction of up to 25 percent, with an average simple payback of under eight years. This reduction of energy consumption in existing buildings can offset the increase in energy use from very efficient new facilities constructed in the next decade.

Table 7. Cost Benefit Summary of Energy Efficiency Retrofit Program

Target Reduction	Annual Capital Investment Required for 8 Year Period	Annual Gross Energy Cost Savings	Annual Net (after debt service) Energy Cost Savings[7]
25 percent	$40-$50 million	$6.7 million in first year increasing to $54 million in year 8	$1.5 million
10 percent	$17 million	$2.7 million in first year increasing to $22 million in year 8	$0.6 million

C. Renewable Power

Renewable power from either local or grid-based sources could be used in conjunction with energy efficiency retrofits to offset the energy use of highly energy-efficient new construction or to further reduce non-renewable power use. In this case, the contribution to meeting the Clean Energy Standard from energy efficiency projects could be lower than the 25 percent figure identified above.

1. Local Renewable Energy Systems

The students' request to supply 25 percent of the University's peak electric load requirements with local renewable energy systems could be accomplished by the installation of approximately 1.5 MW per year of photovoltaic systems or other renewable energy technologies at the campuses over the next eight years. This level of development is technically feasible, and would reduce annual non-renewable energy use by approximately 5 percent. Table 8 assumes that the cost of renewable technologies would approximate the costs of photovoltaic technologies.

Table 8. Cost Benefit Summary of Local Renewable Program

Target Reduction in Peak Demand	Annual Capital Investment Required for 8 Year Period	Annual Gross Energy Cost Savings	Annual Net (after debt service) Energy Cost Savings[8]
25 percent	$5 million	$0.3 million in first year increasing to $2.3 million in year 8	$0

[7] Assumes typical 15 year debt financing rate of 5.5%
[8] Assumes typical 15-year debt financing rate of 5.5%

The capital cost could gradually be reduced over time as the unit prices of solar PV modules are expected to drop in price over time. The University should continue to closely monitor the costs and benefits of renewable energy projects over the next decade.

2. Grid Based Renewable Energy

To meet the California Renewable Portfolio Standard (RPS), an initial investment in green power purchases of approximately $600,000 per year could be required. To meet the RPS standard in 2017, an investment of $1.2 million could be required. The cost of this program could be substantially reduced as energy service providers are required to include renewable content in their portfolio, and the University purchased green power as a part of its direct access supply contract. There are no direct economic benefits for implementing this part of the recommended actions because any premium paid for green-tag or other grid-based power would result in an increase in operating costs.

IX. Recommendations

a. The University should implement a portfolio approach to reduce consumption of non-renewable energy. This approach should include a combination of energy efficiency projects, the incorporation of local renewable power measures for existing and new facilities, and green power purchases from the electrical grid. The appropriate mix of measures to be adopted within the portfolio should be determined by each campus, and the capacity for campuses to adopt these measures is acknowledged to be driven by technological and economic factors, requiring campuses to revisit their energy measures mix on a regular basis. This approach should provide valuable analytical information for improving these goals, resulting in an overall improvement in the University's effect on the environment and on its reliance on fossil fuels during this next decade of capital program growth, with the ultimate goal for campuses of striving to become "climate neutral" with regard to their surrounding environments.

b. The University should strive to achieve a level of grid-provided electricity purchases from renewable sources that will be similar to the State's Renewable Portfolio Standard, which sets a goal of procuring 20% of its electricity needs from renewable sources by 2017. The University should initiate progress towards this objective in 2004 by purchasing 10% of grid-supplied electricity from renewable sources, subject to funding availability and should track progress annually toward achievement of the 2017 goal of 20%.

c. With a goal of providing up to 10 MW of local renewable power by 2014, the University should develop a strategic plan for siting renewable power projects in existing and new facilities. The plan should include demonstration projects for photovoltaic systems and other renewable energy systems, such as landfill gas. The plan should also develop criteria for evaluating the feasibility of a variety of projects, such as incorporating photovoltaic systems with replacement roofing systems in new buildings, as well as the accommodations necessary for eventual installation of photovoltaic systems. The University should track the progress of renewable energy technology improvements, both from cost and technical efficiency aspects. The University should maximize the use of available subsidies and seek pricing reductions from the marketplace, and it should develop funding sources for financing the costs of renewable energy measures.

d. With a goal of reducing systemwide non-renewable energy consumption, the University should develop a strategic plan for implementing energy efficiency projects for existing buildings and infrastructure, including operational changes and the integration of other best practices. The plan should look for opportunities to incorporate energy retrofit projects at the time when other major building renovations are planned and as funding is available, as well as take on stand-alone retrofit projects when the energy savings to be achieved can justify the investment in the retrofit. The University should track the industry's progress in improving techniques for energy retrofits and take advantage of technical improvements as they become available. It should develop funding sources and create a financing program for financing retrofit projects. The initial goal for energy efficiency retrofit projects should be to reduce systemwide energy consumption by 10% or more by 2014 from the 2000 base overall energy consumption level, as determined on a per unit basis. The University should strive to achieve even greater savings as additional potential is identified and funding becomes available.

e. The University should continuously evaluate the feasibility of other energy measures that have an equivalent demonstrable effect on the environment and reduction in fossil fuel usage. In particular, campuses should evaluate their transportation services, including fleet vehicles and public transit.