



OFFICE OF THE PRESIDENT

1111 Franklin Street  
Oakland, CA 94607-5200  
Phone: (510) 987-9074  
Fax: (510) 987-9086  
<http://www.ucop.edu>

January 17, 2003

**ACTION UNDER PRESIDENT'S AUTHORITY -- AMENDMENT OF THE BUDGET FOR CAPITAL IMPROVEMENTS AND THE CAPITAL IMPROVEMENT PROGRAM AND APPROVAL OF EXTERNAL FINANCING FOR CUP IMPROVEMENTS: STEAM TURBINE GENERATOR AND CHILLER COMPRESSOR, SAN DIEGO CAMPUS**

It is recommended that:

**Pursuant to Standing Order 100.4(q)**

- (1) The President amend the 2002-03 Budget for Capital Improvements and the 2002-05 Capital Improvement Program to include the following project:

San Diego: CUP Improvements: Steam Turbine Generator and Chiller Compressor - preliminary plans, working drawings, and construction -- \$5,500,000, to be funded from external financing (\$5,500,000).

**Pursuant to Bylaw 21.4(d) and Standing Order 100.4(nn)**

- (2) The President be authorized to obtain financing not to exceed \$5,500,000 to finance the CUP Improvements: Steam Turbine Generator and Chiller Compressor project, subject to the following conditions:
  - a. Interest only, based on the amount drawn down, shall be paid on the outstanding balance during the construction period;
  - b. Repayment of the debt shall be from San Diego Campus' share of the University Opportunity Fund; and
  - c. The general credit of The Regents shall not be pledged.
- (3) The Officers of The Regents be authorized to provide certification that interest paid by The Regents is excluded from gross income for purposes of federal income taxation under existing law.
- (4) Officers of The Regents be authorized to execute all documents necessary in connection with the above.

**KEY**  
**Capital Improvement Program Abbreviations**

<b>S</b>	Studies
<b>P</b>	Preliminary Plans
<b>W</b>	Working Drawings
<b>C</b>	Construction
<b>E</b>	Equipment
<b>-</b>	State Funds (no abbreviation)
<b>F</b>	Federal Funds
<b>G</b>	Gifts
<b>HR</b>	Hospital Reserve Funds
<b>I</b>	California Institutes for Science and Innovation
<b>LB</b>	Bank Loans or Bonds (External Financing includes Garamendi, Bonds, Stand-By, Interim and Bank Loans)
<b>LR</b>	Regents' Loans (Internal Loans)
<b>N</b>	Reserves other than University Registration Fee (Housing and Parking Reserves)
<b>R</b>	University Registration Fee Reserves
<b>U</b>	Regents' Appropriations (President's Funds, Educational Fund)
<b>X</b>	Campus Funds
<b>CCCI</b>	California Construction Cost Index
<b>EPI</b>	Equipment Price Index

2002-03 Budget for Capital Improvements and  
2002-05 Capital Improvement Program Scheduled for  
Regent's Allocations, Loans, Income Reserves,  
University Registration Fee Reserves, Gift Funds, and Miscellaneous Funds

<u>Campus and Project Title</u>	<u>Prefunded</u>	<u>Proposed 2002-03</u>	<u>Proposed After 2002-03</u>
CUP Improvements: Steam Turbine Generator and Chiller Compressor	---	P \$133,000 LB W \$270,000 LB C \$5,097,000 LB	---
(\$5,500,000)			

**DESCRIPTION**

The San Diego campus requests approval of the Central Utilities Plant Improvements: Steam Turbine Generator and Chiller Compressor project, which would add a three megawatt (3MW) steam turbine generator to the existing cogeneration system, and replace a chiller compressor on the campus' largest water chiller (WC-2). The project would enhance the existing cogeneration plant by increasing its on-site electric production, while reducing electric power purchases and also increasing the operating efficiency of the existing WC-2 chiller.

**Background**

The CUP serves the West Campus with heating, cooling, emergency electrical power, and power generation (using cogeneration) for the majority of the West Campus needs. (The East Campus has its own utility network, due to the distance from the CUP and other constraints.) The campus purchases electricity from a utility provider and generates steam with conventional boilers as needed when demand exceeds cogeneration capacity, and during scheduled maintenance periods.

When the cogeneration addition to the CUP was proposed and approved in the fall of 1999, the sizing of the plant for 95% of the main campus peak electrical demands, and about 65% of the campus peak steam demand, was projected to be optimal. However, growth at San Diego has been rapid owing to increasing enrollments and expanding academic programs. It is now projected that the associated West Campus electrical load will grow from approximately 203,000 megawatts per hour (MWH) per year in FY 2002-03 to over 251,000 MWH per year in 2005-06; a growth of 23.6% in four years. Without the proposed project, this would increase the amount of purchased electricity from approximately 17,000 MWH per year to 46,000 MWH per year during this period.

With limited budget resources, the campus is continually evaluating ways to reduce purchased utility costs. The campus has achieved significant savings since the cogeneration system became operational, and the efficiencies realized by the proposed project are expected to further decrease those costs.

The project would consist of two distinct improvements to enhance the cogeneration plant to increase its on-site electric production, and to increase the operating efficiency of the campus' largest chiller as follows.

#### *Steam Turbine Generator*

The addition of a 3MW steam turbine generator to the cogeneration system would increase the electrical production by over 35,000 MWH per year. In addition, increasing steam loads would result in higher production from both the current gas turbine generators as well as the new steam turbine generator. The result would be a combined electrical power production by both the existing cogeneration plant and the 3MW addition to approximately 243,000 MWH per year. The addition would reduce the amount of purchased electricity to approximately 8,000 MWH per year in 2005-06, which is less than the amount expected to be purchased in FY 2002-03. This alone would result in a significant net annual reduction in purchased electricity expenditures.

#### *Chiller Compressor*

The largest chiller on campus, WC-2, is rated at 4,500-ton capacity. The WC-2 currently operates continuously when available from April through October at an average rate of 3,500 tons for 5,000 hours per year. This project would replace a 30-year old chiller compressor in the WC-2 with a new, more efficient compressor and convert from R-500 to R134a, a more environmentally acceptable refrigerant. The new chiller would be 30% more efficient. The existing steam turbine drive on the WC-2 will be used, but will be refurbished for the new compressor.

#### Project Description

The steam turbine generator component would include:

- Relocating the electrical substation US-7 from the floor to the mezzanine of the CUP;
- Installing a 3MW steam turbine generator package, and surface condenser package on a new concrete slab (in the area vacated by the relocated electrical substation);
- Installing paralleling switchgear and controls to parallel output with the 12KV system at the CUP; and
- Interconnecting the steam, condenser water, and condensate systems to the CUP system.

The new chiller compressor for the WC-2 chiller component would include:

- Using existing evaporator and condenser tube bundles;
- Rebuilding existing steam turbine drive to match new drive train requirements;
- Completing new intercooler with new refrigerant (R-134a); and
- Removing current refrigerant of R-500 that is environmentally unacceptable.

The project would be sited within the existing Central Utility Plant. No increase in the CUP building size would be necessary; equipment could be added within the existing building. Construction on the project would begin in May 2003 and would be completed in April 2004.

CEQA Classification

In accordance with University of California guidelines for the implementation of the California Environmental Quality Act, noise analysis was conducted for the proposed project and determined that the additional equipment to be installed in the existing cogeneration facility would not increase the existing ambient noise as the generator would be housed in a sound attenuating enclosure. In addition, the proposed equipment would comply with all applicable state, federal and local air quality laws; therefore the proposed project is exempt pursuant to CEQA guidelines Class 15329 (b)(2)(3).


Financial Feasibility

The total project cost is estimated at \$5,500,000. The project will be funded from external financing (\$5,500,000). Opportunity Funds are pledged as the source of debt repayment.

Based on long-term debt of \$5,500,000 amortized over 15 years at 5.75% interest, the estimated average annual debt service will be \$557,000. Repayment for the debt will be from the San Diego campus' share of the University Opportunity Funds. Opportunity Funds are a portion of the indirect cost recovery generated by federal contracts and grants. By University policy, up to 65% of the campus's total Opportunity Funds may be pledged for debt service, but only up to 33% of actual debt service may be paid from Opportunity Funds. In fiscal year 2004-05, the first full year of operation, 49% of Opportunity Funds are pledged for debt service.

Further financial information is shown on the Attachment 2.

Approved:



Richard C. Atkinson  
President of the University

Date

(Attachments)

**PROJECT STATISTICS**  
**CUP Improvements: Steam Turbine Generator and Chiller Compressor**  
**Capital Improvement Budget**  
**San Diego Campus**  
**CCCI 4019**

<u>Cost Category</u>	<u>Amount</u>			<u>% of Total</u>
	Chiller			
	<u>3MW STG</u>	<u>Compressor</u>	<u>Total</u>	
Site Clearance	\$ ---	---	---	---
Building	3,000,000	1,507,000	4,507,000	81.9
Exterior Utilities	---	---	---	---
Site Development	---	---	---	---
A/E Fees <sup>(a)</sup>	246,000	124,000	370,000	6.7
Campus Administration <sup>(b)</sup>	123,000	62,000	185,000	3.4
Surveys, Tests	16,000	8,000	24,000	0.4
Special Items <sup>(c)</sup>	119,000	60,000	179,000	3.3
Contingency	157,000	78,000	235,000	4.3
<b><u>Total</u></b>	<b>\$ 3,661,000</b>	<b>1,839,000</b>	<b>5,500,000</b>	<b>100.0</b>
Group 2 & 3 Equipment	---	---	---	---
<b><u>Total Project</u></b>	<b>\$ 3,661,000</b>	<b>1,839,000</b>	<b>5,500,000</b>	<b>100.0</b>

**Statistics**

Gross Square Feet (gsf) <sup>(d)</sup>	N/A
Assignable Square Feet (asf) <sup>(d)</sup>	N/A
Ratio asf/gsf (%)	N/A
Building Cost/gsf <sup>(d)</sup>	N/A
Building Cost/asf <sup>(d)</sup>	N/A

(a) Fees include executive architect and other professional design contract costs.

(b) Campus administration includes project management and inspection.

(c) Special items include EIR studies, special consultants, value engineering, as well as interest during construction/finance costs.

(d) Gross square feet (GSF) is the total area, including usable area, stairways, and space occupied by the structure itself. Assignable square feet (ASF) is the net usable area.

January 2003

## SUMMARY OF FINANCIAL FEASIBILITY ANALYSIS

Project Title: CUP Improvements: Steam Turbine Generator and Chiller Compressor,  
San Diego Campus

Total Estimated Project Cost	\$ 5,500,000
------------------------------	--------------

Proposed Sources of Funding

External Financing	\$ 5,500,000
--------------------	--------------

Proposed Financing Terms

External Financing - \$5,500,000

Interest Rate: 5.75%, 15 years

Average Annual Debt Service - \$557,000

San Diego Opportunity Fund Information:Estimated Annual Revenue (2004-05): <sup>(1)</sup>

Pre-Off-the-Top Generated (Garamendi)	\$ 10,126,000
Opportunity Funds Generated	\$ 31,282,000
Total Estimated Annual Revenue	\$ 41,408,000

Estimated Average Annual Debt Service (2004-05):

Garamendi Debt Service and O&M Expenditures	\$ 10,126,000
Estimated debt service on this project	\$ 557,000
Pledged Expenditures – Other Capital Projects	\$ 9,706,000
Total Estimated Annual Expenses	\$ 20,389,000

<u>% Opportunity Fund Pledged for Debt (policy limit 65%)</u> <sup>(2)</sup>	49%
------------------------------------------------------------------------------	-----

Debt Service Coverage	2.03X
-----------------------	-------

<sup>(1)</sup> Fiscal Year 2004-05 represents first full year of completion for project.