Office of the President
December 30, 2003

TO MEMBERS OF THE COMMITTEE ON GROUNDS AND BUILDINGS AND THE COMMITTEE ON FINANCE:

ITEM FOR ACTION

For Joint Meeting of January 14, 2004

EXECUTIVE SUMMARY

AMENDMENT OF THE BUDGET FOR CAPITAL IMPROVEMENTS AND THE CAPITAL IMPROVEMENT PROGRAM AND APPROVAL OF EXTERNAL FINANCING FOR COGENERATION ADDITION TO THE CENTRAL PLANT, IRVINE CAMPUS

The President recommends that:

(1) The Committee on Grounds and Buildings recommend to The Regents, subject to the concurrence of the Committee on Finance, that the 2003-04 Budget for Capital Improvements and the Capital Improvement Program be amended to include the following project:

From: Irvine: Cogeneration Addition to the Central Plant – preliminary plans -- $1,400,000 to be funded from campus funds

To: Irvine: Cogeneration Addition to the Central Plant – preliminary plans, working drawings, and construction -- $24,416,000 to be funded from external financing.

(2) The Committee on Finance concur with the recommendation of the Committee on Grounds and Buildings to include this project, as described in (1) above.

(3) The Committee on Finance recommend to The Regents that the President be authorized to obtain external financing not to exceed $24,416,000 to finance construction and related costs of the Cogeneration Addition to the Central Plant, Irvine campus, subject to the following conditions:

a. Interest only, based on the amount drawn down, shall be paid on the outstanding balance during the preliminary plans, work drawings, and construction periods;

b. Subject to state approval to use state appropriations for capital purpose (Section 28), repayment of the external financing shall be from the University’s annual appropriation from the State of California and other lawfully available funds of The Regents; and
c. The general credit of The Regents shall not be pledged.

(4) 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.

(5) The Officers of The Regents be authorized to execute all documents necessary in connection with the above.

A Key to the Abbreviations and the project description are attached.
KEY

Capital Improvement Program Abbreviations

S  Studies
P  Preliminary Plans
W  Working Drawings
C  Construction
E  Equipment
-  State Funds (no abbreviation)
F  Federal Funds
G  Gifts
HR  Hospital Reserve Funds
I  California Institutes for Science and Innovation
LB  Bank Loans or Bonds (External Financing includes Garamendi, Bonds, Stand-By, Interim and Bank Loans)
LR  Regents’ Loans (Internal Loans)
N  Reserves other than University Registration Fee (Housing and Parking Reserves)
R  University Registration Fee Reserves
U  Regents’ Appropriations (President’s Funds, Educational Fund)
X  Campus Funds
CCCI  California Construction Cost Index
EPI  Equipment Price Index
2003-04 Budget for Capital Improvements and Capital Improvement Program Scheduled for Regents' Allocation, Loans, Income Reserves, University Registration Fee Reserves, Gift Funds, and Miscellaneous Funds

<table>
<thead>
<tr>
<th>Campus and Project Title</th>
<th>Approved</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cogeneration Addition to the Central Plant</td>
<td>P $1,400,000 X</td>
<td>P ($1,400,000) X</td>
</tr>
<tr>
<td></td>
<td>P $1,166,000 LB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W $538,000 LB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C $22,712,000 LB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>($24,416,000)</td>
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**DESCRIPTION**

This action requests full project approval, approval of external financing, and a change in fund source for the Cogeneration Addition to the Central Plant. The Irvine campus proposes to purchase and install cogeneration equipment in an addition to be constructed adjacent to the existing Central Plant, which serves the main campus’s state-supported space utility needs. Preliminary plans were approved in a separate action.

**Background**

In May 2002, The Regents approved an amendment to the 2001-02 Budget for Capital Improvements and the 2001-04 Capital Improvement Program to include the Cogeneration Addition to the Central Plant project for the Irvine campus. At that time, only preliminary plan funding was approved at a cost of $1,400,000, to be funded from campus funds. The campus is now proposing that the entire project, including preliminary plans, be funded from external financing.

Cogeneration is a proven technology for generating electricity and steam simultaneously from natural gas; cost savings are achieved by the utilization of heat that would otherwise have been wasted. At UCI, the electricity generated would be used to meet electrical needs for state-supported space, while the steam would be used to heat campus buildings, as well as to generate chilled water for air-conditioning.
The campus’s proposal to pursue cogeneration is an extension of UCI’s focus on providing reliable and economical electrical services to campus users. Purchased electricity is a major expense for the campus and costs have increased significantly in recent years. The cost of electricity was approximately 6 cents/kWh in 2000-01, and by 2002-03 the price increased to approximately 9 cents/kWh, a 50% increase. The campus has undertaken many successful measures in the past decade to reduce utility expenses and to optimize capital investments in utility infrastructure. Cogeneration is the next logical step in UCI’s long-term plan to minimize utility costs while maximizing efficient use of natural resources and maintaining or improving the reliability of its utility infrastructure.

With assistance from external consultants, the Irvine campus has completed a comprehensive analysis of the financial and technical parameters of cogeneration and has developed a project proposal specifically tailored to the campus’s needs and conditions. The proposed project is expected to reduce purchased utility costs for state-supported space by an estimated $73.6 million over a 30-year period ($32.8 million net present value in 2006 dollars).

A related state-funded project, slated for construction in 2003-04, will increase the capacity of the campus’s cooling system. This project is planned to proceed in tandem with the cogeneration work, and the two projects will be closely coordinated. Together the projects would maximize resources and achieve greater efficiency than could be realized if only one of the projects were performed.

Project Description

The Cogeneration Addition to the Central Plant would generate up to 13.5 megawatts (MW) of electricity for the campus, and simultaneously generate an average of 50,000 pounds of steam per hour. The source of cogeneration’s efficiency and its financial advantage over purchased electricity is that the energy of natural gas fuel is used to drive a turbine to generate electricity, while the waste heat is used to generate steam. At the time of project completion, 13.5 megawatts would support approximately 70% of peak electrical demand for state-supported space. The 50,000 pounds of steam per hour generated would provide approximately 73% of Central Plant peak steam demand. The campus would continue to purchase electricity (approximately 10.5 MW) from a utility provider and would generate steam with conventional boilers as needed when demand exceeds cogeneration capacity and during maintenance periods. Auxiliary enterprises and non-state-supported space would continue to purchase utilities and would not benefit from cogeneration services or savings.

Elements of the project would include:

- Demolition to clear the site, and construction of an 18,000 gsf building to house the equipment adjacent to the existing Central Plant
- Installation of a combustion turbine generator
- Installation of a heat recovery steam generator
- Equipment to limit air pollution emissions, particularly nitrogen oxides
- Installation of related control and interconnect equipment
• High-pressure natural gas supply
• 12kV cabling to interconnect to the campus’s 66kV primary substation to provide the electrical connection from the cogeneration plant to the campus’s power distribution system
• related systems

The expected life of the plant is greater than 30 years. The operating efficiency of the equipment would allow the campus to meet its overall energy needs at a reduced cost compared to business as usual.

The site for the proposed cogeneration addition is adjacent to UCI’s existing Central Plant. This site is in accordance with the campus’s Long Range Development Plan.

Construction of the proposed Cogeneration Addition project is expected to commence in January 2005 with completion scheduled for September 2006.

CEQA Classification

In accordance with the California Environmental Quality Act and University procedures for implementation of CEQA, the project has been classified categorically exempt under special provisions for cogeneration projects.

Financing Plan

The total project cost of $24,416,000 will be funded from external financing. Based on a debt of $24,416,000 at 6.125% interest, amortized over 30 years, the annual debt service would be $1,798,000.

As presented in the economic analysis (Attachment 2), purchased utility cost savings will more than pay for operating and capital costs for this project. Repayment of the external financing would be from the portion of the University’s annual state appropriation for the purchase of utilities on the Irvine campus for state-supported space. Campus auxiliary enterprises and non-state-supported space utility needs will continue to be purchased from a utility supplier.

Following Regental approval of the requested actions related to this project, the University would request approval from the Department of Finance to expend state budget support (purchased utility) funds toward the debt service for the project. This approval, known as a Section 28 exemption, would be required before financing could be obtained. Bids will not be awarded until the Section 28 exemption is approved.
Financial Analysis

The financial objective of this project is to reduce purchased utilities expense for state-supported space. Cogeneration would accomplish this not only through savings in electricity costs, but also through savings achieved by the use of “waste” heat to meet campus thermal load. To determine the financial feasibility of this project, an economic analysis and risk assessment was performed by an outside consultant experienced in providing similar analyses of other UC cogeneration projects. The analysis compared a business as usual case (the “BAU case”) with the cogeneration case using the campus’s planned plant configuration and load projections.

Key assumptions used in the economic analysis were:

- **Sources of Funds.** The primary source of funds for the proposed project, including repayment of external financing and payment for operation and maintenance costs, would be the annual state appropriation for purchased utilities allocated to the Irvine campus.

- **Loads.** Projected building growth through 2010 was used to project electrical and thermal loads. Beyond 2010, loads were assumed to increase at 1% per year.

- **Inflation.** Overall inflation was assumed to be 3.5% per year.

- **Commodity Prices.** Natural gas was assumed to be $5.00/MMBtu (million British thermal units) at the burner-tip in the year 2006. Electric commodity price was assumed to be 6 cents/kWh in the year 2006, the first full year of operation. For future years, costs were projected based on the assumed inflation factor.

- **Excess Sales.** No revenues were assumed to accrue from excess power sales.

- **Departing Load Charge.** The analysis assumed that in 2006 UCI would be subject to surcharges in the cogeneration case as defined in the *Settlement Agreement Departing Load Phase R. 02-01-011* adopted by the California Public Utilities Commission (CPUC), April 3, 2003.

- **Standby Charges.** In calculating electrical costs, the analysis assumed one power outage at peak/mid-peak rates would occur once every other year.

- **Operations and Maintenance Costs.** The analysis assumed increased Operations and Maintenance (O&M) costs for the cogeneration case due to the increased requirements in cogeneration-related services.

- **Debt Service.** The total project cost of $24,416,000 would be externally financed. The
interest rate was assumed to be 6.125% over 30 years, tax-exempt. The annual debt service would be $1,798,000

- **Net Capital Costs.** The “business as usual” case assumes expenses of $8 million for boilers and electrical service upgrades that would be required in 2006, 2007, and 2010.

The table below summarizes the projected savings of the cogeneration case over the BAU case in both nominal and NPV terms. The project is expected to result in savings over 30 years of $73.6 million in nominal dollars. In net present value terms, savings are estimated to be $32.8 million. The unleveraged internal rate of return is 17.6%.

**ESTIMATED NOMINAL AND NET PRESENT VALUE (NPV) SAVINGS OVER 30 YEARS BUSINESS AS USUAL (BAU) VERSUS COGENERATION (COGEN) ($ IN MILLIONS)**

<table>
<thead>
<tr>
<th>Sources Of Funds</th>
<th>BAU Case</th>
<th>Cogen Case</th>
<th>Net Cogen Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Funds</td>
<td>758.1</td>
<td>758.1</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Total Sources</strong></td>
<td><strong>$758.1</strong></td>
<td><strong>$758.1</strong></td>
<td><strong>$0.0</strong></td>
</tr>
<tr>
<td>Use Of Funds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Costs:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel costs</td>
<td>106.6</td>
<td>355.8</td>
<td>(249.2)</td>
</tr>
<tr>
<td>Electricity costs</td>
<td>589.1</td>
<td>150.9</td>
<td>438.2</td>
</tr>
<tr>
<td>Labor/O&amp;M costs</td>
<td>54.4</td>
<td>116.6</td>
<td>(62.2)</td>
</tr>
<tr>
<td><strong>Net Operating Costs</strong></td>
<td><strong>$750.1</strong></td>
<td><strong>$623.3</strong></td>
<td><strong>$126.8</strong></td>
</tr>
<tr>
<td>Capital Costs/Savings:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net capital costs</td>
<td>8.0</td>
<td>0.0</td>
<td>8.0</td>
</tr>
<tr>
<td>Debt Service</td>
<td>0.0</td>
<td>61.2</td>
<td>(61.2)</td>
</tr>
<tr>
<td><strong>Operating + Capital</strong></td>
<td><strong>$758.1</strong></td>
<td><strong>$684.5</strong></td>
<td><strong>$73.6</strong></td>
</tr>
<tr>
<td>Costs/Savings</td>
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</tr>
<tr>
<td><strong>NPV Savings (in 2006)</strong></td>
<td></td>
<td></td>
<td><strong>$32.8</strong></td>
</tr>
</tbody>
</table>

**Sensitivity Analysis**

Sensitivity analyses were prepared to determine the proposed project's economic resiliency to changes in electricity and natural gas prices. The analysis showed that cogeneration offers benefits to the Irvine campus. The most significant impacts on the economic viability of the project are from natural gas prices moving in opposition to electricity prices. If gas goes up and electricity goes down, the project becomes less favorable. If electricity goes up and gas goes down the project becomes economically more favorable. An equally likely scenario is an
increase in electrical prices. For example, a one-cent increase in electrical prices (from 6 cents/kWh to 7 cents/kWh), holding natural gas prices constant at $5.00/MMBtu results in a 74% increase in the NPV savings of the project. If electricity and gas prices move in parallel, then the project retains its positive rate of return.

The break-even point for the project, holding electricity prices constant at 6 cents/kWh, is a natural gas price of $6.68/MMBtu, a 34% increase over the anticipated 2006 price of $5.00/MMBtu. Additionally, the break-even point for the project, holding natural gas prices constant at $5.00/MMBtu, is an electricity price of 4.6 cents/kWh, a 23% decline over the anticipated 2006 price of 6 cents/kWh.

While short-term divergence in pricing is possible, it is reasonable to assume that long-term future gas and electricity commodity prices would retain their parallel correlation. Natural gas generating plants produce about 40% of the electricity in California. Further, almost all of the major foreseeable additions to in-state capacity are natural gas generating plants, thus closely tying the price of electricity to natural gas. Therefore, short-term pricing variations should have little economic impact on the overall long-term viability of the project.

(Attachment 1 is below; Attachment 2)
PROJECT STATISTICS
COGENERATION ADDITION TO THE CENTRAL PLANT
CAPITAL IMPROVEMENT BUDGET
IRVINE CAMPUS
CCC 4238

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Amount</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Clearance</td>
<td>$182,000</td>
<td>.8%</td>
</tr>
<tr>
<td>Building and Cogen Equipment</td>
<td>15,891,000</td>
<td>65.1%</td>
</tr>
<tr>
<td>Exterior Utilities</td>
<td>2,852,000</td>
<td>11.7%</td>
</tr>
<tr>
<td>Site Development</td>
<td>122,000</td>
<td>.5%</td>
</tr>
<tr>
<td>A/E Fees (a)</td>
<td>1,619,000</td>
<td>6.6%</td>
</tr>
<tr>
<td>Campus Administration (b)</td>
<td>762,000</td>
<td>3.1%</td>
</tr>
<tr>
<td>Surveys, Tests</td>
<td>286,000</td>
<td>1.1%</td>
</tr>
<tr>
<td>Special Items (c)</td>
<td>1,940,000</td>
<td>8.0%</td>
</tr>
<tr>
<td>Contingency</td>
<td>762,000</td>
<td>3.1%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$24,416,000</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Group 2 & 3 Equipment: 0

Total Project: $24,416,000

**Statistics**

- Gross Square Feet (gsf) (d) 18,000
- Assignable Square Feet (asf) (d) N/A
- Ratio asf/gsf (%): UC N/A
- Building Cost/gsf (d) $109
- Building Cost/asf (d) N/A

(a) A/E fees include executive architect basic services, and other professional design contract costs.
(b) Campus administration includes project management and inspection.
(c) Special Items include independent seismic review, value engineering/constructability review, agency review, acoustical consultant, as-built utility survey, Environmental Impact Report, wind tunnel study, and interest during construction.
(d) Gross square feet (gsf) is the total area, including all usable areas, stairways, and space occupied by the structure itself. Building cost per GSF calculation excludes Cogen equipment costs, and is based solely on building cost of $1,969,388.

January 2004