GB4

Office of the President

TO MEMBERS OF THE COMMITTEE ON GROUNDS AND BUILDINGS:

ACTION ITEM

For Meeting of January 18, 2012

AMENDMENT OF THE BUDGET, APPROVAL OF AN INCREASE OF EXTERNAL FINANCING, COMPUTATIONAL RESEARCH AND THEORY, BERKELEY CAMPUS AND LAWRENCE BERKELEY NATIONAL LABORATORY

EXECUTIVE SUMMARY

The proposed project would construct a 73,700 ASF high-performance computing and office facility to support the co-location of Berkeley campus faculty and students with the National Energy Research Scientific Computing Center and Lawrence Berkeley National Laboratory (LBNL) Computational Research Division scientific staff. This facility would enable the advancement of scientific knowledge, education and service by providing a highly productive environment for advanced computational research and theory, and a computational resource of nationally leading capability. Since the time the facility was conceived, the Department of Energy (DOE) has now committed to occupy the facility, has executed an occupancy agreement toward that end, and has authorized $20 million of DOE funds to upgrade Computational Research and Theory (CRT) so it will be suitable for future generations of high speed computing machines.

This item proposes an augmentation of $12 million to be funded with external financing for a total project cost of $124,944,000. The increased total project cost is primarily due to a three-year delay in construction resulting from litigation. Additional costs include design enhancements, legal services, increased site development and construction costs, and costs associated with restarting design and project management. The item also proposes the replacement of $444,000 of LBNL operating funds with a corresponding increase in external financing supported by LBNL, and the replacement of $5 million of gift funds with a corresponding increase in external financing supported by the Berkeley campus.

Previous Actions

March 2007: Approval of Budget ($90,444,000) and External Financing ($85,000,000).
May 2008: Approval of Budget ($112,944,000), External Financing ($107,500,000), certification of Environmental Impact Report and Approval of Design.
November 2008: Reapproval of External Financing ($107,500,000).

Proposed Actions

- Approve a $12 million augmentation for a proposed project budget of $124,944,000.
- Replace $444,000 of LBNL operating funds with external financing.
- Approve an increase of external financing supported by LBNL funds.
- Replace $5 million of gift funds from the Berkeley campus with $5 million of external financing supported by campus funds.

Statement of Issues

- Legal challenges delayed the project by thirty-nine months.
- Judgment in favor of the University and DOE allows construction to proceed.
- Additional funding requested to cover delays and design enhancements.

RECOMMENDATION

1. The President recommends that the Committee on Grounds and Buildings recommend to the Regents that:

   A. The 2011-12 Budget for Capital Improvements and the Capital Improvement Program be amended as follows:

      From: Lawrence Berkeley National Laboratory and Berkeley Campus: Computational Research and Theory Facility – preliminary plans, working drawings, and construction – $112,944,000 to be funded from external financing ($107,500,000), gifts ($5,000,000) and LBNL operating funds ($444,000).

      To: Lawrence Berkeley National Laboratory and Berkeley Campus: Computational Research and Theory Facility – preliminary plans, working drawings, and construction – $124,944,000 to be funded from external financing supported by LBNL funds ($119,944,000), and external financing to be supported by Berkeley campus funds ($5,000,000).

      Deletions shown by strikeout; additions by underscore

   B. The President be authorized to obtain external financing not to exceed ~~$112,944,000~~ $119,944,000 to finance the Computational Research and Theory Facility project, subject to the following conditions:

      (1) Interest only, based on the amount drawn down, shall be paid on the outstanding balance during the construction period;
      (2) As long as the debt is outstanding, the debt service and related requirements of the authorized financing shall be sought first from available Lawrence Berkeley National Laboratory (LBNL) funds, and

(3) The President shall create a contingency funding strategy to pay the debt service for the external financing in the event LBNL funds are not available or insufficient to pay the debt service; and
(4) The general credit of the Regents shall not be pledged.

~~C. The President be authorized to obtain interim financing not to exceed $5,000,000 prior to awarding a construction contract for gift funds not received by that time and subject to the following conditions:~~
~~(1) Interest only, based on the amount drawn down, shall be paid on the outstanding balance during the construction period.~~
~~(2) Repayment of any financing shall be from gift funds. If gift funds are insufficient and some or all of the debt is outstanding, then the Berkeley campus' share of the Opportunity Fund shall be maintained in amounts sufficient to pay the debt service and to meet the related requirements of the authorized financing.~~
~~(3) The general credit of the Regents shall not be pledged~~.

D. Authorize the President to obtain external financing in an amount not to exceed $5,000,000 to finance the Computational Research and Theory Facility project, subject to the following conditions:
(1) Interest only, based on the amount drawn down, shall be paid on the outstanding balance during the construction period.
(2) As long as the debt is outstanding, the general revenues of the Berkeley campus shall be maintained in amounts sufficient to pay the debt service and to meet the related requirements of the authorized financing.
(3) The general credit of the Regents shall not be pledged.

E. All other terms and conditions of the project remain the same.

F. ~~The Officers of the Regents be authorized~~ Authorize the President to execute all documents necessary in connection with the above.

BACKGROUND

LBNL is a recognized leader in high performance computing, networking, applied mathematics and computational science. LBNL operates the National Energy Research Scientific Computing (NERSC) Center, a national user facility in which researchers from around the world can access high speed computing services 365 days per year. NERSC operates two super computers in tandem (systems typically cost over $50 million each) the newest of which, is one of the fastest computers in the world. NERSC presently occupies space in Oakland at the Oakland Scientific Facility (OSF). NERSC has outgrown that space and LBNL would move the NERSC program to the CRT facility, enabling NERSC to increase the size of its computer floor area, increase power capacity at substantially lower rates, improve energy efficiency, and collocate computer scientists, mathematicians and computational scientists, with immediate access to the computing

systems. When completed, the CRT facility would be one of the largest and most energy efficient computing facilities in the country and would be devoted exclusively to the scientific needs of the laboratories and universities.

Computational simulation has taken its place next to experimentation and theory in the scholarly pursuit of scientific and technical investigations, resulting in a rapid growth in the use of computing resources. The Department of Energy (DOE) predicts a shortfall of available computational resources by as much as a factor of ten in 2015. An upgrade of NERSC is a key element in DOE's strategy to meet this demand. This project would provide additional computer floor space and power, meeting the computing demand of DOE. NERSC's strategic plan is to implement a new computing system every three years while maintaining user access to the previous system. Therefore, at any given time, space is needed for two computing systems running in parallel.

NERSC is currently housed in a 19,000 square-foot computer room in leased space at OSF. The power requirement for the high performance computing program is projected to grow from the current electrical demand of 6 MW (megawatts) to 12 MW by 2015. The PG&E power system serving the OSF cannot serve a load of this magnitude at the low rates provided at the LBNL site.

PROJECT DESCRIPTION

The proposed project would provide a new building of approximately 139,700 GSF (73,700 ASF). This includes 28,000 ASF of high-performance computing space and 40,600 ASF for offices, a visualization laboratory, and conference space that would accommodate the entire staff of the LBNL NERSC Division, the Scientific Networking Division (SND), the Computational Research Division (CRD), and some staff from the joint LBNL/UCB Computational Science and Engineering program. The total combined office space will accommodate up to 300 staff members.

A new electrical feeder will be installed from the Grizzly Peak Substation. All other major utilities are available in the immediate area. The facility will include an initial power capacity of 5 MW to serve the initial high performance computing and office loads with an expansion potential to 17 MW.

The March 2007[(a)], May 2008[(b)] and November 2008[(c)] Regents items describe the CRT facility, including expected scope, functionality, and detailed budget requests. This item requests an augmentation to the total project cost.

(a) http://www.universityofcalifornia.edu/regents/regmeet/mar07/gb5.pdf
(b) http://www.universityofcalifornia.edu/regents/regmeet/may08/gb5.pdf
(c) http://www.universityofcalifornia.edu/regents/regmeet/nov08/gb11.pdf

Status and Need for Augmentation

The CRT project was originally planned to start construction in the fall of 2008. The project had been delayed until November 2011 by court order following a successful legal challenge brought in 2008 by a local community organization. The group asserted that, even though CRT is planned, designed and funded by the University, it is, nevertheless a federal project because it is being constructed with the expectation of DOE program occupancy upon its completion. The plaintiffs asserted that, as a consequence, DOE should be ordered to conduct its own environmental review (separate and apart from the Regents' California Environmental Quality Act review) under the National Environmental Protection Act (NEPA). The court agreed with the plaintiffs and halted construction until DOE conducted a NEPA review.

That NEPA review was completed in March 2011, and the same group filed suit challenging the adequacy of the NEPA document. The parties agreed that no construction would commence until the court decided that case. The hearing on the subsequent NEPA challenge was held on October 20, 2011 and the Court entered judgment in favor of DOE and the University on November 14, 2011. As a result, the project may proceed to construction.

To control costs, the CRT project team conducted several extensive value engineering sessions and constructability reviews. These sessions resulted in estimated construction cost reductions of $6.9 million. Any further cost reductions would impact the program or energy efficiency.

The three-year delay has increased the overall cost of the project as follows:

Breakdown of Augmentation Request:

Building & Site Development	$ 5.09 million
A/E Fees	1.66 million
Campus Administration	1.19 million
Surveys, Tests, Plans	0.31 million
Special Items	3.70 million
Financing Costs	(.20) million
Contingency	0.25 million
TOTAL	$ 12.00 million

Without the augmentation, the CRT project will need to reduce scope to meet the existing approved budget. The reduced scope will detrimentally impact the operations of NERSC by eliminating the base isolated computer floor, shelling out 32,000 GSF of office space, thus displacing CRD and NERSC employees and significantly reducing landscaping.

Description of the Additional Expenses

Building
With this additional funding, the project proposes to add a base isolated computer floor. The base isolated computer floor will be one of the first of its kind. The floor will protect the supercomputers from damage up to a maximum credible seismic event. The project has restored a loading dock and road to the design. The loading dock and road were value engineered early in the project. Restoring the loading dock and road will significantly improve the safe handling of the supercomputers.

A/E Fees
Due to the legal delay, the building design was placed on hold. When the design was stopped, the drawings were at the 50 percent Construction Documents phase. This cost includes remobilizing the design team, design modifications for technology advances in cooling the computer racks, design modifications for the base isolated computer floor, and exterior and elevation modifications.

Campus Administration
The legal delay has extended the project duration. Staffing was reduced during the time the design was on hold but some project activities continued. The project team also provided support for the legal defense of the first action.

Surveys, Tests, Plans
One of the issued raised in the legal challenge concerned the project's proximity to the fault line. To address this issue, LBNL requested support from the geotechnical firm to respond to comments and to perform supplemental investigations.

Special Items
The legal expenses were incurred exclusively in the first lawsuit. The Laboratory Counsel and University Office of General Counsel represented the University at no additional cost in the second lawsuit. Even though the University was represented by experienced outside counsel at favorable negotiated hourly rates, the first lawsuit resulted in extraordinary expense because of the unique nature of the challenge in which the plaintiff's counsel conducted voluminous discovery both in California and in Washington D.C.

Because the University incurred no expense in defense of the successful second lawsuit and because all trial court proceedings are concluded, there will be no additional legal expenses associated with the environmental legal challenges. (In the unlikely event of appeal, the matter would be handled by the Department of Justice and Lab and UC counsel at no additional UC expense.)

Special items also include preconstruction fees from the construction manager/general contractor (CM/GC). Due to the delay, design changes, and value engineering changes, the CM/GC provided additional cost estimates, constructability reviews, schedules, value engineering support, and prepared a second set of bid documents.

Additional Funding From DOE
Since the last Regents' Meeting, DOE has solidified its support for CRT by authorizing $20 million of additional funding to increase the power and cooling capacity of CRT to accommodate future generations of supercomputers in a separate project (NERSC Relocation Project).

The NERSC Relocation Project will provide power and cooling to accommodate NERSC computing equipment, staff, and users in the CRT building at LBNL. The scope includes all necessary design, project management, construction activities and start-up of operations. The following project goals are based on current estimates for the staff and equipment expected to be completed by 2015:

- Air cooling capacity of 0.75 MW to 1.5 MW for computers.
- Liquid cooling capacity of 9 MW to 14 MW for computers.
- Electrical capacity of 9 MW to 10 MW for computers.
- Backup generator and UPS capacity of 500 kW to 750 kW.
- Chilled water capability of 65 degree water to the computers.

Design, construction and management of this improvement project will be coordinated with the CRT project. The CRT facility is planned to be energy efficient with a LEED™ "Gold" rating. The NERSC Relocation Project contributes significantly to this goal by installing energy efficient equipment and by incorporating innovative design strategies with measurement and verification capabilities.

ATTACHMENTS:

Attachment 1: Project Budget
Attachment 2: Debt Service Funding Plan
Attachment 3: Summary of Financial Feasibility
Attachment 4: LBNL Debt Service Funding Plan

ATTACHMENT 1

PROJECT BUDGET
CCCI 5135

Category	Approved Budget May 2008	Augment Request	Proposed Budget Jan 2012	% of Total
Site Clearance	$ 749,000	$ 0	$ 749,000	0.6%
Building	82,390,000	4,991,000	87,381,000	69.9%
Exterior Utilities	2,421,000	0	2,421,000	1.9%
Site Development	2,756,000	100,000	2,856,000	2.3%
A/E Fees	7,309,000	1,655,000	8,964,000	7.2%
Campus Administration	3,544,000	1,199,000	4,743,000	3.8%
Surveys, Tests, Plans	590,000	310,000	900,000	0.7%
Special Items (excluding financing)	1,769,000	3,697,000	5,466,000	4.4%
Financing Costs [(d)]	7,000,000	(200,000)	6,800,000	5.4%
Contingency	4,416,000	248,000	4,664,000	3.7%
Total	$ 112,944,000	$ 12,000,000	$ 124,944,000	100.0%
Group 2 & 3 Equipment	0	0	0	
Project Cost	**$ 112,944,000**	**$ 12,000,000**	**$ 124,944,000**	

Project Statistics	May 2008	Jan 2012
GSF	126,300 [(e)]	139,700
ASF	73,000	73,700
Efficiency Ratio: ASF/GSF	58%	52%
Building Cost/GSF	$652	$625
Project Cost/GSF	$894	$894

Comparable Projects

Comparable project costs cannot be provided due to the unique nature of this project, the lack of a universal unit cost, and the unique site of this project.

(d) Interest During Construction is calculated at 4.7 percent.

(e) The difference between the May 2008 and January 2012 GSF figures is due to an error in calculating the May 2008 figure. Not all of the mechanical and electrical space was included in the May 2008 figure

ATTACHMENT 2

DEBT SERVICE FUNDING PLAN

The source of payment of the debt service on $119,944,000 will be LBNL operating funds to the extent DOE or other LBNL-funded programs occupy the facility supplemented as necessary with LBNL unrestricted funds. The source of payment of the debt service on $5 million of the project will be from external financing supported by campus funds from Berkeley. (LBNL is authorized to charge DOE a preapproved annual reimbursement rate for DOE occupancy. This rate does not fully cover the debt service. See Table below and Attachment 3.

Fund Source ($000s)	Debt Service	Funding Plan
Facility Occupancy Charge	$9,910	$ 6,405
UCB Debt Service	413	413
Unrestricted Funds (Performance Fee/Royalty Income)		3,363
STIP Interest on Accumulated Unrestricted Funds		142
Total	$10,323	$10,323

As previously described, the NERSC computing program -- with an annual budget of more than $60 million -- has outgrown its current location and must move to a different facility. The DOE program sponsors for NERSC have approved relocating NERSC to CRT. To facilitate the NERSC move to CRT, of the $55 million in the NERSC FY 2012 budget, DOE has also approved use of a portion of those funds toward "engineering efforts related to facility upgrades supporting future NERSC systems intended to occupy the CRT at LBNL. . . . " (*DOE Contract Work Authorization*, August 1, 2011). For efficiency, these upgrades will be installed during initial construction. DOE also has concluded that moving NERSC and other computing programs to the LBNL site is appropriate because of the substantial savings in electricity costs from operating the NERSC and other computing programs at the LBNL site. (DOE Office of Science, Acquisition Strategy for the NERSC Relocation Project) This is because the Lab has access to wholesale electricity rates through DOE's agreement with the Western Area Power Administration (WAPA). The Lab has projected savings of $4.6 million per year in reduced electricity costs when NERSC and other computing programs are able to operate at CRT. The $4.6 million per year in reduced electricity costs is calculated at the 7.5 MW usage level and increases to $10.6 million per year when usage increases to 17 MW. This savings is achieved with WAPA rates that are seven cents per kilowatt hour lower than Pacific Gas and Electric.

CRT will also serve as home to two other large DOE funded computing programs with a combined annual budget of $65 million. This brings the total federal program dollars that will be occupying and using CRT at $120 million annually. Thus, even if one of the three programs were reduced or cut, LBNL would still have significant program dollars to pay the CRT debt service. In the very unlikely event that all federal computing programs were terminated, LBNL would be free to move other Lab programs into the space and charge for it. Should DOE be unable to fund any program from the Lab's $750 million budget to occupy the CRT building,

LBNL would seek non-DOE programs such as NSF, NIH, or even private tenants. The combination of the Berkeley Campus and Lab computational expertise, coupled with WAPA power rates make CRT an exceptionally attractive site for such use. Computing space of this kind is in very high demand such that other National Laboratories have successfully placed systems from multiple different federal agencies in their facility.

In the even more unlikely event DOE, other LBNL-funded or other federal programs no longer might occupy the CRT facility, the debt service will be paid initially via the contingency strategy described and approved by the Regents at the November 2008 meeting and updated for the revised debt service amount below.

Debt Service Contingency Funding Strategy – LBNL Portion		
Fund Source ($000s)	Expected Funding Source	Contingency Plan
LBNL Occupancy charge and unrestricted funds	$9,910	-
Berkeley Lease of Facility	-	$4,000 to $4,600
LBNL Unrestricted Funds	-	$4,210
Office of the President (cover short fall)	-	$1,100to $1,700
Total	$9,910	$9,910

UC Berkeley Leased Space

UC Berkeley currently leases between 300,000-400,000 square feet of office and other space in the City of Berkeley for non-DOE purposes, at an annual cost of $12 million. The Campus has expressed a willingness to shift up to 100,000 square feet to CRT as it becomes available at market rates that would produce estimated revenues of $4 million to $4.6 million annually. In addition, from 2012 through 2020, the Berkeley campus will need 100,000 square feet per year of primarily office space for "surge" needs for seismic renovations. The campus would be able to use the CRT facility for this purpose as well, which could generate income to support the debt service.

LBNL Unrestricted Funds

Approximately $4.3 million of performance fee per year is given to the LBNL Director for the Director’s discretionary use of which approximately $3.4 million is available. In addition, the Lab annually earns approximately $1.3 million in Royalty Income which can be used for any research related purpose.

Office of the President Bridge Funds

At the President's direction, the Office of the President will pledge the balance, if any remains after the above sources have been exhausted, to pay the debt service on the CRT building. This bridge will remain in effect for five years from the date it is first used. Thus, assuming the worst

case scenario - that no DOE programs were to occupy CRT - the Office of the President's commitment would be in the range of $1.1 million to $1.7 million per year for five years. By the end of five years, it is expected that a new leasing and occupancy strategy would have been developed and implemented by the Office of the President in conjunction with the Berkeley campus and LBNL.

Conclusion

Since the original Regent's Item approving the preliminary design and budget, DOE has committed to occupying the CRT facility when it is constructed. DOE has also executed an occupancy agreement underscoring a DOE mission need for CRT and an agreement to occupy the facility upon completion. The vision of a UC-financed, DOE occupied facility at the Berkeley Lab is on the threshold of success.

Risks

Utilizing University resources for the CRT project poses certain risks to the University.

- Should DOE curtail funding at LBNL such that CRT became surplus to Lab operations and the contingency plan then ultimately runs course, there is a risk that the University could be responsible for the entire debt service on the facility until a non-DOE tenant or other revenue sources were developed.

Additional financial feasibility information may be found in Attachments 3 and 4.

ATTACHMENT 3

SUMMARY OF FINANCIAL FEASIBILITY

Berkeley Campus	
Project Name	Computational Research and Theory
Project ID	912314
Total Estimated Project Cost	$124,944,000

Proposed Sources of Funding	
External Financing supported by LBNL (See Table Below)	$119,944,000
External Financing supported by UCB	$5,000,000
Total	$124,944,000

Financing Assumptions for UC Berkeley	
Amount Financed	$5,000,000 (long term debt)
Anticipated Repayment Source	General Revenues of the Berkeley Campus
Anticipated Fund Source	Campus funds (see note below on fund sources)
Financial Feasibility Rate	7.25% - 30 year amortized
First Full Year of Principal	Year 1 (debt model assumes FY 2015)
Final Maturity	Year 30 (debt model assumes FY 2044)
Estimated Annual Debt Service	$413,000 (long term debt)

	Berkeley Campus Financing Benchmarks	
Measure	10 Year Projections Max/Min Values	Approval Threshold
Debt Service to Operations	5.6% (max: FY2016)	6.0%
Debt Service Coverage	2.35x (min: FY 2016)	1.75x
Expendable Resources to Debt	n/a	1.0x

Financing approval requires the campus to meet the debt service to operations benchmark and one of the two other benchmarks for approval.

Fund sources for external financing shall adhere to University policy on repayment for capital projects.

ATTACHMENT 4

LBNL DEBT SERVICE FUNDING PLAN

Year	CRT and SERC Occupancy fee (1)	Endowment Annual Total Return Payout Amount @ 4.75% (2)	Total	Total LBNL Debt Service (3)	Delta Revenue - Debt	Annual Unrestricted Funds (4)	Annual Unrestricted Funds towards CRT and SERC Debt Service	Remaining Unrestricted Fund Balance with STIP Interest Earnings
1	$10,288,608	$741,932	$11,030,540	$(13,578,039)	(2,547,498)	$4.7M	$3,589,962	$1,063,313
5	$10,465,213	$695,385	$11,160,598	$(13,578,039)	(2,417,440)	$4.7M	$3,589,962	$5,487,797
10	$11,435,915	$641,286	$12,077,201	$(13,578,039)	(1,500,837)	$4.7M	$3,589,963	$15,585,997
15	$10,113,255	$591,396	$10,704,651	$(13,578,039)	(2,873,388)	$4.7M	$3,589,962	$23,982,098
20	$8,790,595	$545,387	$9,335,982	$(13,578,039)	(4,242,057)	$4.7M	$3,589,962	$25,978,742
25	$7,467,935	$502,958	$7,970,893	$(13,578,039)	(5,607,146)	$4.7M	$3,589,962	$20,929,512
30	$4,382,505	$463,829	$4,846,335	$(13,578,039)	(8,731,704)	$4.7M	$3,589,962	$0
33	$3,871,371	$0	$3,871,371	$0	$3,871,371	$0	$0	$12,125,247
	$284,827,821	$17,772,243	$302,600,063	$(407,341,160)	$(104,741,097)	$141M	$107,698,865	

1. Occupancy fee is set by depreciation and cost of capital calculation known as FCCM. FCCM rate is set by the Treasury Secretary and historically tracks 5-year notes. Reimbursement assumes a slightly increasing FCCM rate over the life of the debt.
2. $14.4M gift from Simons' Foundations.
3. LBNL Debt service for external financing for CRT ($119.9M) and SERC ($44.4M and includes $30M if lease revenue bonds are not appropriated).
4. Net of operating expenses.