

Office of the President

TO MEMBERS OF THE FINANCE AND CAPITAL STRATEGIES COMMITTEE:

ACTION ITEM

For Meeting of July 19, 2023

PRELIMINARY PLANS FUNDING AND EXTERNAL FINANCING, CLEAN ENERGY CAMPUS — ELECTRIFIED HEATING AND COOLING PLANT, DISTRIBUTION, AND DISTRIBUTED ENERGY RESOURCES, BERKELEY CAMPUS

EXECUTIVE SUMMARY

As part of the “Clean Energy Campus” initiative, the Berkeley campus proposes to replace its existing, aged fossil fuel cogeneration plant and steam system and transform the Berkeley campus into a 100 percent electrified and renewable energy microgrid that reduces campus carbon emissions by 85 percent. This infrastructure renewal program will include a new electrified heating and cooling plant (EHCP); distribution of hot/cold water to over 12 million square feet of space in approximately 100 campus buildings; distributed energy resources (DERs) including solar photovoltaics, battery storage, geothermal heat exchange and fuel cells for efficiency and critical load backup; and upgrades to the campus electrical infrastructure to support a doubling of power needs. The campus’s goal is to have significant portions of the new system operational by 2028 and be substantially complete by 2031. In addition to addressing campus carbon emissions, the project enables the campus to address substantial restoration and renewal needs across its energy infrastructure.

The State of California has appropriated State General Funds to support external financing for the campus’s Clean Energy Campus Project in the 2023 State Budget Act.¹ The Regents are asked to: (1) approve funding for preliminary plans for \$40 million, and (2) approve external financing of \$40 million supported by State General Fund appropriations.

During preliminary plans, the campus will confirm the project scope and budget; complete site surveys and geotechnical testing for EHCP and DERs; confirm buildings for initial distribution connections; confirm required electrical infrastructure improvements; and complete environmental review pursuant to the California Environmental Quality Act (CEQA). The campus anticipates returning to the Regents for full budget and design approval following action pursuant to CEQA in the fall of 2024.

¹ Provision 30 of Item 6440-001-0001 State Budget Act of 2023 (Senate Bill 101), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB101.

RECOMMENDATION

The President of the University recommends that the Finance and Capital Strategies Committee recommend to the Regents that:

- A. The 2022-23 Budget for Capital Improvements and the Capital Improvement Program be amended to include the following project:

Berkeley: Clean Energy Campus – Electrified Heating and Cooling Plant, Distribution, and Distributed Energy Resources – preliminary plans – \$40 million to be funded with external financing supported by State General Fund appropriations.

- B. External financing be approved in an amount not to exceed \$40 million plus related interest expense and additional related financing costs to finance Clean Energy Campus – Electrified Heating and Cooling Plant, Distribution, and Distributed Energy Resources. The following requirements shall be satisfied:

- (1) The primary source of repayment shall be from State General Fund appropriations, pursuant to the Education Code Section 92493 et seq. Should State General Fund appropriation funds not be available, the President shall have the authority to use any legally available funds to make debt service payments.
- (2) The general credit of the Regents shall not be pledged.

BACKGROUND AND PROJECT DRIVERS

The Berkeley campus manages and provides several of its own utilities. The campus is served by a natural gas cogeneration plant that provides heat and power to the campus. The campus works with a third-party operator for the cogeneration plant and directly maintains and supports all other utilities, including underground steam and high voltage lines, seven switch stations, and a 12KV substation on the Hill Campus. When the campus needs more power than can be provided by this plant, power is drawn from Pacific Gas & Electric through a campus-owned substation.

In 2015 the campus initiated a study to determine how to position its utilities infrastructure to serve existing and future needs and to reduce campus greenhouse gas emissions. Through these analyses, the campus determined that replacing the existing cogeneration plant and steam system with a new, centralized electrified heating and cooling plant (EHCP) providing heating and cooling to the campus through new hot and chilled water distribution piping was the optimal solution. The studies also identified a set of new on-site DERs that would provide efficiency and energy resiliency for critical loads. See Attachment 4 for more information on alternatives considered.

The Clean Energy Campus initiative consolidates the recommendations of these studies to align

the capital, restoration, and renewal requirements of the campus energy system with other campus goals. The campus's approach achieves multiple objectives:

Infrastructure Restoration and Renewal: The initiative provides over \$300 million in avoided restoration and renewal costs by replacing failing in-building equipment with new centralized equipment. It will achieve a reduction of over \$110 million in operating expenses over the system's life through improved reliability and avoided costs of carbon. The proposed DERs will provide sufficient power and backup capacity to support campus critical loads, such as life safety provisions and research protection during an extended outage.

Sustainability and Carbon Reduction: The initiative achieves an approximately 70 percent reduction in carbon emissions when the existing cogeneration plant is decommissioned, and the initial set of the most energy-intensive buildings are connected to the new EHCP; this, along with future biomethane supplies will move the campus below the regulated threshold of California's Cap and Trade program. The new system would provide an 85 percent reduction in building-related energy carbon emissions at full build-out.

Planning for Future Campus Resiliency and Growth: The initiative creates a reliable and resilient utility system with a sufficient electrical and thermal capacity to support future campus operations, enrollment, and new development consistent with the Berkeley campus's Long Range Development Plan (LRDP).

PROJECT DESCRIPTION AND SCOPE

The project consists of three primary components: (1) the new EHCP, (2) hot and chilled water distribution systems, and (3) DERs to provide efficiency and resiliency for critical loads. This new infrastructure will provide much-needed reliability and allow the campus to support planned LRDP growth that existing utility infrastructure cannot support. Refer to Attachments 2 and 3 for Project Graphics.

Electrified Heating and Cooling Plant (EHCP): The project will construct the EHCP with electrified heat pumps and chillers, a geothermal heat exchange well under the building, and thermal storage tanks using recycled water. The EHCP is being planned to provide additional electrical capacity to support the campus's planned growth consistent with its LRDP. The new plant would replace the campus's existing cogeneration plant, serve the entire campus, and be located on the Campus Park to serve as a living laboratory for campus affiliates and visitors. (see Attachment 2)

Distribution System: The campus plans to install new underground hot and chilled water piping to serve approximately 100 buildings, convert buildings to accept hot and chilled water piping loops in lieu of steam, and upgrade the high voltage system as necessary to electrify campus utilities. In the initial implementation, the campus would connect its most energy-intensive buildings to the new system (see Attachment 2), shifting approximately 75 percent of its thermal energy load to the new EHCP. Other campus facilities would be connected after the initial

distribution network is complete. Other facilities planned and constructed prior to full operation or distribution from the EHCP would be designed to be compatible with the new distribution system and EHCP.

Distributed Energy Resources (DERs): The project will plan for approximately 15 MW of solar photovoltaic systems, 8 MW of green-hydrogen-ready fuel cells, and 30 MWh of battery storage. These systems would limit the power to preserve critical campus functions during an outage. The campus anticipates that future development of these DERs would require private partner power and storage service agreements (PPAs) to enable future capital construction; however, the campus would use a portion of the State funding allocation to design these systems to be compatible with the other components of the Clean Energy Campus initiative.

Each component would be designed to be implemented and operated independently. The EHCP would be able to operate and provide heating and cooling to the campus with or without the implementation of any DERs. The DERs would be designed to provide energy resilience with either the existing campus energy systems, or they could be connected to the EHCP and its distribution system once operational. The design and operation of the EHCP and distribution is not dependent on specific DERs; the campus intends to make decisions about specific DERs after their technical feasibility has been confirmed and/or when funding is available for their implementation. Individual components of the Clean Energy Campus initiative, like the DERs, may be subject to separate and future CEQA review from the EHCP and its associated distribution system.

Sustainability

The Clean Energy Campus initiative will help chart implementation of the UC Sustainable Practices Policy by meeting and exceeding the goals and procedures of climate protection, green building, clean energy, and sustainable water, and achieving an 85 percent reduction in building energy-related carbon emissions, moving the campus below the regulated threshold of California's Cap and Trade program. The Sustainable Practices Policy establishes goals for green building, clean energy, transportation, climate protection, facilities operations, zero waste, procurement, food service, health and well-being, equity and inclusion, sustainability performance, and water systems. The project's budgeting, programming, and design effort includes a full range of sustainability practices for facility design and operations.

Funding Plan and Financial Feasibility

The anticipated financial investment and funding strategy required for the Clean Energy Campus initiative is being refined as the campus completes planning and design work for the system. The campus would use \$40 million of external financing supported by State General Funds appropriated for the Clean Energy Campus Project to support the preliminary plans phase through design development and complete the necessary environmental review. This phase of work will include the design of the EHCP and distribution systems, as well as planning work for the DERs and decommissioning.

As part of the 2022 State Budget Act, the State appropriated \$83 million to the Berkeley campus for this project, intending to provide two additional \$83 million allocations in the following two fiscal years (for a total \$249 million investment).² The 2023 State Budget Act continues this commitment but would shift the funding approach from one-time State General Funds to appropriating additional State General Funds to support external financing for UC-issued bonds.³

The campus also expects to seek other funding sources to complete the Clean Energy Campus initiative, including PPAs for the DERs. A funding plan for construction would be presented to the Regents when the campus returns for project budget approvals prior to construction. The project is included in the Berkeley campus's chapter of the 2022-28 Capital Financial Plan.

Additional information may be found in Attachment 2, Summary of Financial Feasibility.

Schedule and Project Delivery

The campus plans to implement the Clean Energy Campus initiative by 2031, pending sufficient resources for its components. This schedule would be refined in the preliminary plan phase. Continued progress towards implementation is critical to ensure that the campus can avoid escalation and other delays that affect project cost and feasibility. The initial State investment is anticipated to enable the campus to complete preliminary plans for the EHCP, distribution, and DERs, and to support the implementation of multiple make-ready projects to accommodate increased campuswide electrical demand and central cooling towers over the next several years⁴. Future State capital outlay, as proposed in the State Budget Act of 2022, would support the initial construction of the plant and distribution systems. Construction is anticipated to begin by 2025 or after funding is secured. The campus is evaluating project delivery methods, including Construction Manager at Risk and various forms of Design-Build.

Small Business Enterprises (SBE) and Disabled Veteran Business Enterprises (DVBE)

The campus is committed to promoting and increasing participation of Small Business Enterprises (SBEs) and Disabled Veteran Business Enterprises (DVBEs) in all purchasing and contract business, subject to any applicable obligations under State and federal law, collective bargaining agreements, and University policies. The campus regularly communicates with interested contractors and consultants to provide information about finding opportunities to work at the campus and encourages them to respond to the annual announcement soliciting interest to perform services. Providing qualified SBEs with the maximum opportunity to participate will be encouraged with the selected design professionals and contractors to meet 25 percent participation.

² Provision 44 of Item 6440-001-0001 State Budget Act of 2022 (Final Budget Summary), <https://www.dgs.ca.gov/-/media/Divisions/OSP/Publications/Final-Budget-Summary-2022-23-ADA.pdf?la=en&hash=6C5E83E6CB990F8C07F613D8CA356563B53BD616>

³ Provision 30 of Item 6440-001-0001 State Budget Act of 2023 (Senate Bill 101), https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240SB101.

⁴ Make-ready projects would be approved by separate actions under Regents Policy 8103, Policy on Capital Project Matters, and DA2629 - Delegations of Authority Capital Project Matters.

The Clean Energy Campus project will also comply with additional business and labor requirements of the Federal Inflation Reduction Act to ensure the maximum direct payments available for renewable energy installations.

Key to Acronyms

CEQA	California Environmental Quality Act
DER	Distributed Energy Resources
EHCP	Electrified Heating and Cooling Plant
LRDP	Long Range Development Plan
PPA	Power Purchase Agreement

ATTACHMENTS

Attachment 1:	Preliminary Plans Budget
Attachment 2:	Summary of Financial Feasibility
Attachment 3:	Project Location
Attachment 4:	Project Graphics
Attachment 5:	Alternatives Considered

ATTACHMENT 1

PRELIMINARY PLANS BUDGET

PROJECT USES	AMOUNT	PERCENTAGE
A&E Fees ⁽¹⁾	\$22,000,000	55%
Campus Administration ⁽²⁾	2,000,000	5%
Surveys, Test, and Plans ⁽³⁾	4,000,000	10%
Special Items ⁽⁴⁾	12,000,000	30%
TOTAL PRELIMINARY PLANS BUDGET	\$40,000,000	100%
Notes:		
(1) A&E Fees include Architect and design professional consultants, and external project/construction management.		
(2) Campus Administration includes project management, planning, engineering, and design review through design development.		
(3) Surveys, Tests, and Plans include geotechnical soil borings, site surveying, and other design-phase testing as necessary.		
(4) Special Items include programming, CEQA documentation, peer reviews, specialty consultants, and agency fees.		

Anticipated preliminary plans phase activities include the following:

- The campus will select a design team consisting of an engineering firm as a primary consultant with a supporting architectural design firm.
- The selected team will provide program validation, complete schematic design, and design development documents.
- The team will also provide pre-construction services such as cost estimating, scheduling, constructability, and risk analysis.
- Extensive reviews will be required, including peer reviews and collaborative design-phase reviews by the Campus Building Official, Campus Fire Marshal, and Facilities Services.

SUMMARY OF FINANCIAL FEASIBILITY

BERKELEY CAMPUS	
Project Name	Clean Energy Campus
Project ID	912893
Total Estimated Project Cost (Preliminary Plans)	\$40,000,000
Anticipated Interest During Construction (included in total estimated project cost)	-

PROPOSED SOURCES OF FUNDING¹	
External Financing – AB 94	\$40,000,000

¹Fund sources for external financing shall adhere to the University policy on repayment for capital projects.

SECTION I. Financed Projects

FINANCING ASSUMPTIONS	
Total External Financing	\$40,000,000
Anticipated Repayment Source	State General Funds appropriations
Anticipated Fund Source	State General Funds
Financial Feasibility Rate	4.25%
First Year of Principal (e.g., FY 20XX)	2024
Term (e.g., 30 years)	30 Years
Final Maturity (e.g., FY 20XX)	2053
Estimated Average Annual Debt Service	\$2,384,000

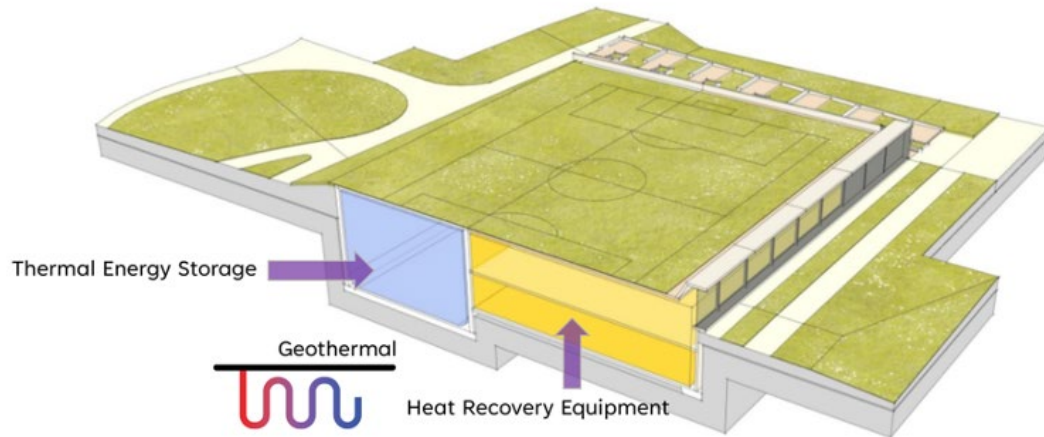
PROJECT LOCATION



PROJECT GRAPHICS



3.1 View of the new plant from the southeast. The new plant will provide views into the facility's inner workings and offer a community learning center.



3.2 Building Cross-Section. The new plant will be built on an existing recreation field in the Campus Park. A majority of the core energy systems will be underground, including plant equipment, thermal energy storage tanks, and geothermal systems, to allow the roof to be used for other purposes.

ALTERNATIVES CONSIDERED

- Business as Usual - Maintain the existing cogeneration plant, steam distribution, and limited in-building cooling systems.
 - This was rejected because of the deteriorated condition of the existing systems, the continuation of reliance on natural gas combustion, and the increased costs associated with deferred maintenance and increased cost of operations of the aging systems.

- Nodal electrified plants distributed across campus.
 - This was rejected because of the lack of space for multiple plants and the increased complexity and cost of maintenance.