



Award Category

Best Overall Sustainable Design

Green Features

- Heat-recovery condensing boilers
- Solar hot water heating
- Operable windows integrated with HVAC
- Energy Star appliances
- Reflective roof and paving surfaces
- Chemical-free cooling tower
- Low-flow plumbing fixtures
- Recycling chutes
- Green cleaning program
- Construction waste recycling

Size

209,000 ft²

Cost

\$61.6 million

Annual Energy and Cost Savings

35% below Title 24 standards (estimated)

\$68,500

Completion Date

August 2009

CSU Sacramento American River Courtyard

Through the use of highly efficient systems and technologies, the American River Courtyard residence hall has achieved exemplary energy savings. In addition, the building's residents enjoy healthy and comfortable living spaces, in part a result of the project's inclusive and responsive design process.

American River Courtyard is a four-story residence hall that provides housing and associated facilities—including lounges, study rooms, kitchen areas, laundry rooms, and recreation rooms—for more than 600 students at CSU Sacramento. Completed in 2009, it was the first dormitory to be built on the campus in more than 20 years. The building has increased the campus' student housing capacity by 50 percent, bringing the university much closer to its goal of transitioning from a commuter campus to a residential campus.



American River Courtyard residence hall main entrance. Photo: California State University, Sacramento.

The project is the first building at the CSU Sacramento campus to attain LEED certification. It achieved a LEED Gold rating, and the building's design exceeds Title 24 energy requirements by nearly 35 percent. Data collected during the first year of operation have substantiated the estimated energy savings.

The building is equipped with high-efficiency HVAC equipment (boilers, chillers, and air handlers), a solar water heating system, efficient lighting (lamps and ballasts), and ENERGY STAR appliances, as well as an energy-efficient envelope (roof, walls, and windows).

The building's state-of-the-art, highly efficient Turbocor chillers feature variable-speed

centrifugal compression, magnetic bearings, and digital controls. The compressors are also 100 percent oil-free. The heating system includes condensing boilers from Aerco with a rated efficiency of 93 percent, and the heat-recovery system recovers both the "sensible and latent" heat from the flue exhaust. In addition, a reflective white "cool" roof and reflective paving materials help keep the building and the surrounding area cooler on hot, sunny days, minimizing the need for cooling and mitigating the "heat island effect." Also, the building's windows all have dual-pane glazing with a low-e coating, a U-factor between 0.35 and 0.57, and a solar heat gain coefficient (SHGC) of 0.76.

Due to the building's exceptional energy conserving features, the project received \$85,000 in Savings by Design awards from the Sacramento Municipal Utilities District and Pacific Gas & Electric.

Other innovative energy-saving features include window interlocks that automatically shut off a room's heating and cooling system whenever a window is opened in that room. The building also has Modicon Momentum programmable logic controllers. Demand response strategies are being developed campus-wide through the university's participation in the Smart Grid Project.

American River Courtyard has many additional green attributes beyond energy efficiency, including features related to site sustainability and alternative transportation, water efficiency, indoor air quality, and resource use/waste reduction.

Bike racks are provided next to the building, as well as preferred parking spaces for alternative-fuel and low-emission vehicles. A green housekeeping program was instituted to ensure that the building is cleaned using

BEST PRACTICES

Additional Awards

LEED NC Gold (v2.2)

Best New Public Project of 2009, *Sacramento Business Journal*

Savings By Design

SMUD Community Energy Award

Environmental Recognition Award, Sacramento Environmental Commission

Sacramento Sustainable Business of the Year, Business Environmental Resource Center

Contact

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Project Team

Architect: Mogavero Notestine Associates
Mechanical/Plumbing Engineer: Interface Engineering
Electrical Engineer: Rex Moore
Structural Engineer: BORM
Civil Engineer: Nolte Associates
Landscape Architect: HLA Group
Contractor: Brown Construction

More Information

www.csus.edu/aba/green



Residents enjoy views of the center courtyard from their rooms, and it provides them with easy access to a common outdoor space. Photo: Victor Takahashi.

less-toxic cleaning products. The cooling tower is a Dolphin unit that treats water without using chemicals. Low-flow, water-efficient toilets, sink faucets, and showerheads are providing water savings of approximately 37 percent. Carbon dioxide sensors are installed throughout the building to alert building operators if the outside air supply is insufficient. Paints, carpeting, adhesives, and sealants used in the building have very low levels of VOCs (volatile organic compounds), to protect indoor air quality for occupant health. Natural daylight is brought deep into the building spaces via light shelves, and all occupied spaces have views to the outdoors; these features help enhance the residents' wellbeing. In addition, 75 percent of the project's construction waste was recycled, and recycling chutes are provided on each floor—next to the trash chutes—making it easy for residents to recycle.

The design process for this project was particularly unique. From the beginning and throughout the process, the design team solicited input from students, parents, and housing department staff, through a series of focus groups and online surveys.

A successful participatory design process enabled user and operator groups to provide input and contribute to the project outcome.

The participants' feedback was then incorporated into the building's design. For example, focus groups indicated that students wanted the rooms to have more privacy and more space; this informed the design of the apartment-style residential suites. Also, survey respondents expressed a desire for ample natural lighting and common areas. Designing the building with a central courtyard was one of the ways

those preferences were addressed. The courtyard also allows students to enjoy the outdoors without needing to leave the complex.

LESSONS LEARNED

The project's collaborative design process, which included input from students, parents, and housing staff, was integral to the project's success. Nathaniel Martin of CSU Sacramento's Facilities Services believes that the project benefitted greatly from getting "buy-in" from the building's future occupants. Housing department staff members were also happy with the process, as they felt they had been consulted, and they can see how their input influenced the final design.

Facilities staff encountered one issue with the cooling tower, an innovative chemical-free system that had not been used on campus prior to this project. The staff noticed a chiller-tube fouling problem during the non-cooling season. They determined that some water circulation was needed to prevent the fouling, and they changed their procedures accordingly. Water is now circulated through the system for one hour per day during the non-cooling season.

Best Practices case studies are coordinated by the Green Building Research Center, at the University of California, Berkeley.

The Best Practices Competition showcases successful projects on UC and CSU campuses to assist campuses in achieving energy efficiency and sustainability goals. Funding for *Best Practices* is provided by the UC/CSU/IOU Energy Efficiency Partnership.

