



Award Category

Best Overall Sustainable Design

Plant Green Features

21% of building is recycled material

Energy-efficient lighting

Classroom Green Features

90% of construction waste diverted from landfill

43% of materials manufactured locally

35% reduction in water consumption

Annual Energy Savings

Plant: 24% below Title 24 standards

Classroom: 37% below Title 24 standards

Size

Plant: 29,000 ft²

Classroom: 93,600 ft²

Cost

Plant: \$27 million

Classroom: \$26 million

Completion Date

Plant: August 2005

Classroom: January 2006

UC Merced Central Plant & Classroom and Office Building

UC Merced is the UC system's first new campus in forty years. Constructing high-performance facilities that meet ambitious energy and environmental performance targets is standard procedure for the new campus, making it a model for sustainable development in the rapidly-growing San Joaquin Valley.

Being the tenth and newest UC campus has afforded UC Merced a unique opportunity to integrate sustainability into its infrastructure from the foundation up. The university has adopted the unprecedented goal of earning LEED®-NC Silver certification from the U.S. Green Building Council for every facility. The Central Plant and the Classroom and Office Building together exemplify UC Merced's integrated approach to constructing the new campus, and showcase its success in meeting aggressive energy and environmental performance targets.

To expedite its efforts to earn LEED Silver campus-wide, UC Merced developed twelve prototype credits for infrastructure and policies that apply universally across all campus buildings. These credits are submitted with every new construction project, with the individual characteristics of each facility making up the remaining credits. Having prototype credits pre-approved by the USGBC streamlines documentation and allows the university to dedicate resources towards developing and implementing other sustainability measures.

While its baseline ambition is LEED Silver, the university is not shy about aiming for Gold. Both the Central Plant and the Classroom and Office Building have earned this level of distinction, making UC Merced the first UC to have two projects certified at Gold or higher.

The Central Plant is the second project in the UC system to achieve certification above LEED-NC Silver.

The Central Plant is designed to meet campus loads through the first phase of build-out, which will be completed between 2015 and 2020. Space is reserved for a cogeneration plant and additional equipment that will be installed as the campus expands. The complex includes a two-story plant building, a two-million gallon thermal energy storage (TES) tank and a telecommunications building.

UC Merced took great care to select sustainable materials for the Central Plant. Twenty-one percent of materials are made with recycled content, including Armstrong ceiling tiles made of 77 percent recycled phone books and newspaper, carpet containing 33 percent used soda bottles, insulation made with 30 percent recycled glass, and rebar, framing members and structural steel containing 90 percent metal diverted from landfill. Additional sustainable materials include low-emitting paints, sealants, flooring and composite wood.



View of the campus's two-million gallon thermal energy storage tank. Photo: UC Merced.

The Central Plant beats California's Title 24 2001 Standards for energy efficiency by 24 percent. This is achieved through efficient lighting systems using compact fluorescent lamps with electronic ballasts, low-e double glazed windows, and a high-performance HVAC system with variable frequency drives.

With temperatures in Merced regularly reaching over 100°F in summer, responsible energy use is a major concern both for the campus's sustainability aspirations and its wallet. The university established energy performance targets early in the campus planning process to make conservation a priority and ensure

BEST PRACTICES

Additional Awards

Plant: LEED-NC Gold

Plant: 2007 Honor Award for Architecture: American Institute of Architects

Classroom: LEED-NC Gold

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Plant Team

Architect, MEP: Arup

Structural Engineer: Skidmore, Owings & Merrill LLP

Landscape Architect: Peter Walker & Partners

Contractor: Swinerton Builders

LEED Consultant: Lynn Simon & Associates

Classroom Team

Architect: Thomas Hacker & Associates

Mechanical Engineer: Taylor Engineering, Inc.

Electrical Engineer: The Engineering Enterprise

Structural Engineer: Forell Elsesser Engineers

Plumbing: Capital Engineering

Lighting: JS Nolan & Associates

LEED Consultant: Lynn Simon & Associates

More Information

[UC Merced sustainability website](#)

maximum savings. The university set targets by analyzing operational data from other campuses and adjusting for variables such as climate and building type. The Central Plant design and mechanical equipment selections were then based on these targets, leading to right-sizing of the campus utility infrastructure. A pared-down utility system reduced initial costs and helps UC Merced meet its goal for all buildings to outperform Title 24 by 30 percent.

UC Merced's chilled water system forms the core of its energy efficiency achievements. The system begins with the TES tank where water is chilled at night to shift the campus's electrical cooling load to off-peak hours. This load management strategy lets UC Merced take advantage of lower electricity rates, and reduces strain on the state's energy infrastructure. Water stored in the TES tank overnight is discharged through the chilled water loop the following day to cool buildings without requiring activation of the plant's chillers.



The Classroom and Office Building is UC Merced's second LEED Gold project. Photo: Michael Romano.

The campus chilled water system helps reduce energy costs for the Classroom and Office Building to 56 percent less than the cost to operate a Title 24 baseline building. Contributing to the building's efficiency is a variable-air-volume, dual-fan, dual-duct HVAC system with direct digital controls. The building also

has high performance lighting with occupant controls, carbon dioxide sensors that minimize airflow during low occupancy, and operable windows that disable space conditioning.

The building's direct digital energy management and control system monitors energy use of the whole building and all sub-components, including lighting zones and air handling units. This level of monitoring enables the campus to confirm that all parts of the building are performing as designed, and facilitates identification of any equipment failures.

Low-flow fixtures and waterless urinals reduce water consumption at the Classroom and Office Building to 35 percent below a baseline building.

The building contains a variety of sustainable materials, many of which have local origins to reduce environmental impacts from transportation. Forty-three percent of materials were manufactured locally, and 20 percent of the content of those materials were extracted locally. Materials with recycled content make up another 20 percent of the building.

The Central Plant and the Classroom and Office Building are just part of the first wave of high-performance facilities planned for the UC Merced campus. As the university grows and continues to deliver impressive sustainable design, each and every project will model environmentally-responsible development for the greater San Joaquin Valley.

LESSONS LEARNED

Performing a building flush-out after construction and before occupancy reduces indoor air quality contamination and protects occupant health. A tight project schedule for the Central Plant almost caused UC Merced to forego this important procedure. The campus now allocates time for a flush-out in all project schedules to ensure new buildings are in top condition for tenant move-in.

Best Practices is written and produced 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.



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