College of the Desert
Campus-wide Lighting Retrofit

As part of a comprehensive campus-wide energy efficiency program, this lighting retrofit upgraded luminaries, lamps and controls, and has reduced associated energy consumption, peak time-of-day demand charges, as well as ongoing maintenance requirements.

The Board of Trustees of the Desert Community College District (DCCD) adopted a sustainability policy in 2010 that set an energy reduction target of ten percent for the College of the Desert. To meet this goal, the campus formulated a comprehensive energy reduction plan that included numerous strategies: energy retrofits of building HVAC and lighting, EMS control optimization, monitoring-based commissioning, energy-efficient new construction, and new training and education programs.

Implementing these strategies required careful planning by facilities staff, as the campus was in the middle of a ten-year program of renovation of existing buildings and design and construction of new facilities; therefore all energy improvements had to be implemented in a coordinated manner. Steve Renew, director of facilities services, explains that with an annual energy bill of over $1.1 million, the campus had a strong incentive to reduce energy costs. The lighting retrofit was an effective way to get energy savings in a way that would not tax the campus’ facility group that consists of only two full-time staff.

Before the retrofit, lighting levels in many spaces were higher than standard recommended levels, and occupancy and daylight controls were lacking. The technical approach taken was straightforward, upgrading fixtures throughout campus with high-efficiency lamps, and where required, luminaires also. All incandescent lamps in classrooms and offices were replaced with compact fluorescent lamps. In high-bay spaces such as the gym, mechanics lab, and central plant, existing 400-watt metal halide luminaires were replaced with high-output T5 fixtures, yielding energy savings of 52 percent. Classrooms and offices that had 32-watt T8 lamps were upgraded to high-efficiency 25 or 28-watt T8 lamps with 5000K lamps.

Owned Utilities (CCC/IOU) Partnership Program, and also used funding available from the DCCD’s bond program. In collaboration with the partnership, Southern California Edison commissioned a review of the campus infrastructure, and provided a list of energy conserving measures that was used in the retrofit planning. SCE provided incentives worth $402,728, with approximately $44,000 dedicated for the lighting retrofit program.

The campus has reduced energy by 15 percent, far exceeding the original target of 10 percent.

Before the retrofit, lighting in gymnasium before (left) and after (right) the lighting retrofit. Images: College of the Desert.
In coordination with the lighting retrofit, the campus’ energy management system (EMS) was extended to all buildings included in the energy retrofit projects. The system, based on open-source LonWorks protocols, now controls approximately 50 buildings, totalling close to 500,000 ft². As part of the energy retrofit, operation schedules were optimized for occupancy and energy efficiency. A dedicated page was created on the EMS to enable manual demand response control, which will allow the campus to take advantage of the benefits offered by the critical peak pricing (CPP) structure currently in use at the school. This dedicated page allows facility staff to implement temporary control strategies to meet the specific conditions of a CPP event. The campus has plans to expand the capability of the EMS energy displays in the future, possibly with a public web-based interface, or a desktop “widget” that allows the wider campus community to understand and explore energy use in campus buildings.

**LESSONS LEARNED**

While the lighting retrofit has been generally well accepted by building occupants, in areas that previously had high illumination levels, some occupants had trouble adjusting to the lower light levels. Users noted that in the mechanics workshop, some work areas not directly under lights do not have sufficient illumination levels for visually demanding tasks. Steve Renew points out that faculty “spend their lives in these offices and classrooms,” and that the project team learned the importance of keeping occupants informed of the retrofit plans and possible disruptions.

The retrofit included measurement equipment to enable future monitoring-based commissioning (MBCx) planned by the campus.

He also recommends inclusion of additional metering equipment during retrofit projects to enable measurement and verification of key systems, and for easy implementation of future measurement based commissioning (MBCx) projects. (The campus plans to undertake MBCx projects in key buildings in the near future.)

Because the project team was motivated to share the lessons learned from this project with other facility managers, they documented an implementation strategy to be used for projects implemented with the CCC/IOU Partnership Program, and in compliance with California Government Code section 4217, which governs design-build energy projects by public entities.