Spectrally Enhanced Lighting: San Ramon Valley Conference Center Case Study

Spectrally enhanced lighting (SEL) is a lighting design technique that saves energy by changing the color of light to be closer to daylight. Buildings that are retrofitted with SEL can reduce their energy costs by 25–50%.

The San Ramon Valley Conference Center is a multi-building, 220,000-square-foot campus 35 miles east of downtown San Francisco. It is owned by PG&E and often accommodates as many as 700 people.

DOE research studies show that by simply shifting the color in fluorescent lamps from the warmer yellow end of the color spectrum to the cooler blue end of the spectrum, we can see things more clearly and spaces appear brighter. Therefore, when we change the color of light to be more like daylight, lighting levels can be reduced to save energy while still achieving the same visual acuity. In T8s with electronically ballasted fluorescent lighting systems, this translates to a 20 percent energy savings, and in T12s with magnetically ballasted systems, SEL can achieve a 50 percent savings.

Inefficient, unreliable lighting at its San Ramon Valley Conference Center prompted Pacific Gas & Electric Company (PG&E) to retrofit its California conference and training facility with SEL. The ongoing multi-phase project is already paying off with low-maintenance lighting that brightly illuminates conference rooms and classrooms.

> "The lighting was very well received. We went from moody, warm lighting to a very clear light that is so much easier to work under."
>
> Karen Guedmin, Building Superintendent
> San Ramon Valley Conference Center

As an energy company, PG&E knows the value of reducing electricity costs through efficient lighting. Maintaining the lighting system in the 220,000 square feet of buildings on its San Ramon Valley Conference Center campus was proving difficult and often required flying an expert into town to make repairs. The campus is used around the clock for PG&E conferences and training, as well as classes for local colleges, so the long delays to repair the existing lighting control systems were unacceptable. In 2004, the company began a multi-phase retrofit to upgrade lighting throughout the campus.

The Upgrade

The San Ramon Valley Conference Center's retrofit involves many fixtures of varying types in spaces ranging from small classrooms and laboratories to spacious conference rooms and dining halls. Throughout the campus, inefficient T12 fluorescent lamps are being replaced with T8 and T5 lamps with a CCT of 5000K.

Much of the $1.4 million retrofit, including a 400-person classroom, was done in 2004, 2005, and 2006. The remainder of the project, including the second-largest conference room and the dining hall, is being completed now. All of the work is done without disruption to staff or conference attendees.

Conclusions

Unreliable, inefficient lighting and difficult repairs drove PG&E to search out a better way to light its San Ramon Valley Conference Center. SEL technology provided the solution, with low-maintenance lighting fixtures and highly efficient lamps that provide better illumination.

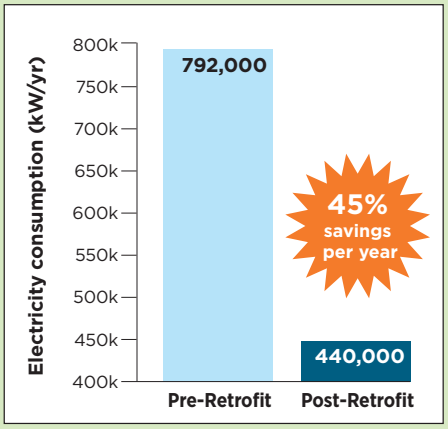
Anecdotal evidence indicates that staff, students, and other building occupants are pleased with the results.

San Ramon Valley Conference Center

Typical Luminaire Retrofit

	Pre-Retrofit	Post-Retrofit
Multi-purpose 400-person Conference Room		
Fixture	4' x 4' recessed parabolic	8' direct/indirect pendant
Lamp(s)	(6) 34 Watt/735 lamp	(2) 54 Watt T5HO/850
Fixture	Recessed incandescent downlight	Recessed CFL downlight
Lamp(s)	(1) 250 Watt PAR Halogen	(2) 26 Watt CFL/850
Energy Savings	**30%**	
Typical Classroom		
Fixture	2' x 4' recessed parabolic	Retrofit kit
Lamp(s)	(3) 34 Watt/735 lamp	(2) 32 Watt T8/850
Energy Savings	**65%**	
Utility Areas		
Fixture	Various	No change
Lamp(s)	34 Watt T12/735	32 Watt T8/850
Ballast	Normal BF ballast	Low BF ballast
Energy Savings	**50%**	

Note: Ballast factor reflects dimmed lighting.



Note: Electricity and cost savings are estimated.

Pre-Retrofit

Post-Retrofit

LIGHTING TERMS

PG&E selected T8 and T5 fluorescent lamps with a temperature of 5000K for its retrofits

Correlated color temperature (CCT)—A measure of the color appearance of a white light source. It is measured on the Kelvin absolute temperature scale and commonly ranges from 2700K (warm white) to 8000K (sky white).

Color rendering index (CRI)—A measure of how a light source renders the colors of objects. CRI is given as a number from 0 to 100, with 80 being the minimum CRI recommended for interior lighting.

Electronic ballast and ballast factor (BF)—To improve energy efficiency, SEL technology usually includes Premium electronic ballasts designed to work with the new T8 or T5HO fluorescent lamps. Ballast factor (BF) is the factor applied to the rated lumens of the lamps and is a function of the lamp/ballast combination employed. When dimming ballasts are used, the dimmed BF should be used in all calculations.

T8—A type of fluorescent lamp. The "T" means it is tubular in shape and the "8" means the diameter is eight-eighths of an inch, or 1 inch. A T12 lamp is twelve-eighths of an inch, or 1.5 inches thick. T8 lamps have a better CRI and are more efficient than T12 lamps.

850—A number that combines the CCT and CRI into one number. The "8" in 850 refers to a CCT of 5000K. A 735 lamp would have a CRI in the 70s and a CCT of 3500K.

For More Information

For more information about spectrally enhanced lighting, or to download complete technical reports about its feasibility and economics, visit www.eere.energy.gov/buildings/spectrally_enhanced.html.

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