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## Tunable Lighting in a Senior-Care Facility

DOE's GATEWAY program has released a [new report](#) on a pilot installation of tunable-white LED systems at the ACC Care Center, a senior-care facility in Sacramento, CA. The project was coordinated by the Sacramento Municipal Utility District (SMUD), which worked with ACC to establish goals that included learning more about how tunable-white lighting impacts the sleep patterns, nighttime safety, and other behaviors of the residents; and better equipping the staff to provide excellent care by improving the quality of lighting (e.g., reduced glare, better controllability) relative to the incumbent system.

DOE's role in the project was to take pre- and post-installation field measurements of illuminance and color quality, advise SMUD on what equipment to specify, and compare the energy consumption of the new system with that of the old one. The lighting solutions followed guidelines published by the Lighting Research Center of Rensselaer Polytechnic Institute, which are based on the role light is believed to play in suppressing the release of melatonin, a hormone that helps control the sleep-wake cycle. Disturbed sleep patterns are common among the residents of senior-care facilities.

The project site was the ACC Care Center. At the time of specification, there were very few tunable-spectrum luminaires available that were suitable for replacing the incumbent fluorescent systems. Several different tunable-white LED systems were chosen and were installed in one corridor, two resident rooms, the nurse station, the common family room, and the administrator's office. The incumbent fluorescent systems were evaluated in August 2015 and the trial LED systems in December 2015.



The illuminance levels in the resident rooms and bathrooms did not meet current industry standards with the incumbent fluorescent system, but exceeded Illuminating Engineering Society recommendations for the over-65 age group with the LED system. Color consistency for the tunable LED luminaires used in the corridors, nurse station, family room, and administrator's office was very good between luminaires and over the dimming range. Energy savings for the tunable LED luminaires in the corridors was 45% relative to the fluorescent system, based on the reduced power, but those savings increased to 68% when the automatic dimming was considered.

The combination of spectral tuning and dimming with the LED systems in the residents' rooms, the adjacent corridor, and the nurse station made it possible to use light that was likely to suppress the production of melatonin from morning to midday, and that was less likely to suppress production of melatonin in the evening and at night. ACC staff documented a number of important health-related benefits that may have been attributable, at least in part, to the lighting changes.

For example, among the three residents studied, agitated behaviors such as yelling and crying decreased following the LED trial installation. In addition, psychotropic and sleep medications were significantly reduced for one of the residents. And in the corridor studied, the number of patient falls recorded decreased after the LED installation. On top of that, it was reported that residents of other corridors were now "hanging out" in the LED corridor.

Among the lessons learned from the project were that contractors aren't yet familiar with tunable systems and controls, that finding the proper balance of automatic versus manual tuning of the lighting spectrum and intensity is challenging, and that educating residents and staff is essential when implementing new lighting solutions in senior-care facilities.

Despite the small size of the pilot study, the ACC Care Center plans to incorporate many of the lighting solutions and strategies as best practices for future renovations and expansion.

For full details on this informative study, [download the report](#).

Best regards,  
Jim Brodrick

As always, if you have questions or comments, you can reach us at [postings@akoyaonline.com](mailto:postings@akoyaonline.com).