



Energy Efficiency & Customer Research & Development Technology Brief...Smart Vanity Lighting System

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The Smart Vanity Lighting System

SMUD teamed up with the California Lighting Technology Center (CLTC), the California Energy Commission's PIER program, MetalOptics/SpecLight, The WattStopper Inc. and SMUD customers to develop a 'smart' vanity lighting system for hotels, assisted living facilities and skilled nursing centers. The new fixture includes energy efficient fluorescent lighting, an integrated motion sensor and an LED nightlight with battery back-up that doubles as a safety light during power outages. The project team decided to use manual-on /automatic-off controls because using automatic-on systems in bathrooms may be disruptive and contribute to impaired night vision.



Smart vanity lighting system

Based upon preliminary monitoring data, the team expects the new fixture to reduce bathroom lighting energy consumption by as much as fifty percent. However, what makes this system unique is the built-in indirect LED nightlight.

The new vanity lighting system includes an LED array that is designed to provide enough light to enable a person to safely navigate within a bathroom while preserving dark adaptation and night vision capabilities. The fixture does a remarkable job of providing low-level illumination while operating in the nightlight mode (see photo). Why is this so important? One word: **safety**. When a person who has been sleeping walks into a bathroom and turns on the light, he or she usually



System in the nightlight mode

experiences difficulty seeing until the eyes adjust to the brightness. This occurs because the bright light bleaches out the rhodopsin, the chemical in the eye required for night vision. When the person turns off the bathroom light and returns to bed, vision is once again impaired until the eyes adapt to the darkness. Research has shown that this temporary 'blindness' may contribute to many falling and tripping accidents that occur at night – especially for senior citizens. In fact, according to Rensselaer Polytechnic Institute's Lighting Research Center, tripping and falling accidents are the number one issue facing senior housing providers.

According to Dr. Michael Siminovitch, Director of the CLTC, the LED nightlight may enhance safety: *"In our research we found that the indirect LED array provides enough light for people to discern objects within a room while maintaining their night vision."*

Another key benefit of the system is that the LED nightlight also serves as a safety light during power outages. This is accomplished through the use of a simple 9 Volt rechargeable battery that will provide enough power to illuminate the LED array for up to several hours. Since many hotel guestrooms don't have emergency lighting, this feature may enhance safety and provide peace of mind.

The Journey

The idea for the new light came from a previous research project conducted at the DoubleTree Hotel in 2002: The LED Lighting Controls Project. The objective of this project was to develop and commercialize a wall-mounted occupancy sensor with a built-in LED nightlight. The study revealed what many hotel managers already knew: hotel guests often leave the bathroom lights on for extended periods and use the bathroom light as a nightlight. Monitoring data showed that the WN100 LED wall sensor reduced bathroom lighting energy consumption by an average



WN100 Wall Sensor

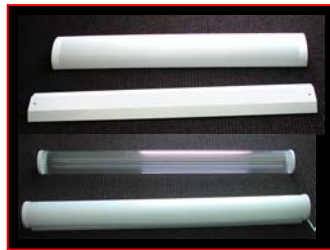
of 50 percent.¹ Furthermore, when guests were asked about the sensor, their response was overwhelmingly positive. Many guests said the nightlight made them feel safer and didn't realize that it was also an occupancy sensor. Encouraged by the success of the project, the team began to explore the possibility of incorporating the LED nightlight and the occupancy sensor into a high-efficiency, decorative lighting fixture.

The project team developed several different fixture prototypes using a variety of materials and LED nightlight configurations. The primary design objectives were to:

- ❑ Develop an energy-efficient vanity fixture that would enhance safety by providing low-level illumination (via an LED nightlight) during normal operation and a safety light during power outages.
- ❑ Develop an aesthetically pleasing light fixture that would be suitable for the hotel industry, assisted living facilities, skilled nursing centers and college dormitories.
- ❑ Develop a control system that would not require any significant field-wiring changes and would work for most applications.



Early prototype fixture with lens removed



Some early lens options

By far the biggest technical challenge was developing controls for the system that would not require installing additional field wiring and would provide the safety light during power outages. The solution came in the form of an innovative control scheme developed and patented by the project team.

Project Participants

After developing several different fixture prototypes and conducting extensive lab testing, a final design was selected, manufactured and then approved by Underwriters Laboratories (U.L.). The vanity lighting system was ready for testing in the field. The project team wanted to test the system in three different venues: a senior assisted living facility, a skilled nursing center and a hotel. Ultimately, three SMUD customers agreed to participate in a field study by installing the fixtures and providing site access to the research team:

1. **Regency Place** offers both condominiums and assisted living suites for senior citizens. Regency Place is operated under the Eskaton Corporation.
2. **Emerald Gardens Nursing Center** provides skilled nursing and rehabilitation services for senior citizens and is operated by Covenant Care Inc.
3. **Red Lion Hotel** is a full-service hotel that features conference facilities and 375 guest rooms and suites. The Red Lion Hotel is owned and operated by WestCoast Hospitality Inc.

All participants were offered fixtures in two, three or four foot lengths and a choice of two lens options: faux-marble or white acrylic with a perforated metal sleeve.

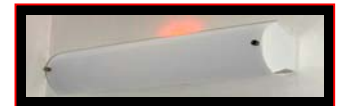


4ft. fixture with lens removed



4ft. fixture with faux marble lens

Regency Place and the Red Lion Hotel both chose the faux-marble lens while Emerald Gardens decided upon the white acrylic with the perforated metal sleeve.



2ft. fixture with perforated metal/acrylic lens

Stay Tuned...

As of April 2005, Regency Place and Emerald Gardens have installed the fixtures and the project team is monitoring their performance. The Red Lion Hotel expects to have all of fixtures installed by the end of May.

If all goes well, the fixture is expected to be commercially available through MetalOptics/SpecLight (800) 324-2669, www.metaloptics.com by July 1st. Stay tuned for a full technology evaluation report in the fall of 2005!

¹For more information about the WN100 project please download the "LED Sensor" technology evaluation report available under "LED Technologies" at <http://www.smud.org/education/cat/index.html>.

The Customer Advanced Technologies Program

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