

Franklin Street, Chapel Hill, N.C., before (left) and after LED street lighting installation.



## U.S. Cities Go Green with **LEDs**

Tom Price

Cities and towns across the United States are incorporating solid-state lighting into their infrastructures.

Commercial and public institutions are embracing light-emitting diodes (LEDs) as an illumination source because LEDs promise long-term cost savings and a way to reduce pollution. Individual consumers—who are less likely to calculate long-run return on investment—are a harder sell. To promote LED use, the U.S. Department of Energy (DOE) has established programs designed to advance LED quality and consumer acceptance.

Because they are much more efficient than most current lighting, LEDs could reduce U.S. energy consumption for lighting by a third in two decades, according to James Brodrick, manager of the DOE's solid-state lighting program. That would eliminate the need for 44 power plants generating 1,000 megawatts each; cut the equivalent of 47 million automobiles' greenhouse gas emissions; and reduce U.S. dependence on foreign fuels, he said. Unlike mercury-

containing fluorescent lights, LEDs contain no toxic material. In addition, establishing U.S. leadership in solid-state-lighting would produce well-paying high-tech jobs, Brodrick added.

All new U.S. traffic signals use LEDs, because each LED signal head saves \$48 per year compared with incandescent heads.

LEDs also have better visual performance and decreased maintenance costs compared to other light sources, according to Mathew Sommers of GE Lumination and Deb Lovig of Cree Inc.,

an LED manufacturer. Since LEDs last longer than other lights, they need to be replaced less frequently, thereby reducing the cost of procurement management and the need for warehouse space.

Lovig, who promotes LED use by municipalities and educational institutions, reported successful switches occurring from North Carolina to Alaska and from street lights to dormitories:

- ▶ Administrators in Anchorage, Alaska, saved the city \$1.5 million a year by switching to LED street lights.
- ▶ LEDs were installed in all can lights in Indian Wells, Calif, where city leaders recovered their investment in two years.
- ▶ At the Raleigh, N.C. Convention Center, LEDs halved energy use in the parking garage. Administrators anticipate a three-year return on investment.

► At North Carolina State University, half the lights in the rooms of a campus dorm were switched to LEDs. The school experienced a dramatic reduction in maintenance costs. Workers had to replace traditional bulbs in the unswitched half of the dorm several times each day, while not a single LED was replaced in a year.

LEDs reduce maintenance costs also because they don't fail suddenly, as incandescent lights do, said Sommers, LED design manager at GE Lumination. When LEDs "fail," their light-production drops to 70 percent, so they don't need to be replaced immediately.

All new U.S. traffic signals use LEDs, Sommers said, because each LED signal head saves \$48 per year compared with incandescent heads. Part of the savings stems from the LEDs' ability to generate colors without the waste caused by filtering white light through a colored lens. The state of Kentucky retrofitted 70,000 traffic signals and cut annual energy costs by \$1.7 million and maintenance by \$1.5 million, Sommers reported.

LEDs are taking hold in outdoor lighting, too, he said. In addition to being more energy-efficient, LEDs are more directional and don't throw unwanted light onto adjoining properties or into the air as light pollution. LEDs' more-uniform lighting also improves visibility.

Indoors, LEDs use 80 percent less electricity than fluorescent lights in retail-store display cases, Sommers said. They also enhance visual appeal by reducing glare and distributing light more uniformly.

In its effort to encourage LED use, the DOE studied compact fluorescent lights' (CFLs) failure to catch on with the public. Too many CFLs made in the 1980s didn't live up to their hype, Brodrick said. Even today, he added, they often don't deliver what their packages promise. As a result, consumers are less willing to buy.

Now, a rapidly expanding number of LED products are entering the



James Brodrick shows off the 90-lumens-per-watt entry for the L Prize technology competition at the Washington, D.C. briefing.

LED technology is evolving quickly, with new generations of devices becoming available every four to six months.

marketplace. Some are good, Brodrick said, but many are following their CFL predecessors in failing to perform as promised. That could lead consumers to reject LEDs as well.

To address that problem, the DOE coordinates independent testing of LED products. It encourages manufacturers to stamp their products with a "Lighting Facts" label—similar to a food nutrition label—which lists a product's lumens, watts, efficiency, color accuracy and correlated color temperature. The department also sponsors competitions that award prizes for residential lighting products, commercial lighting products and replacements for incandescent and halogen lamps. "With these programs,

we're getting manufacturers to aim high," Brodrick said.

The department supports demonstration projects to learn how LED products perform over time in the real world. Brodrick cited LED lighting of the new I-35W bridge in Minneapolis—which replaced the bridge that collapsed in 2007—as an example. Researchers can study how well the lights stand up to the constant vibration caused by bridge traffic. And, he quipped, they can learn if pigeon droppings cause any damage.

LED use will increase as their costs decrease, Brodrick said, and speedier manufacturing methods will drive costs down. To promote faster production, the DOE reaches beyond LED manufacturers to work with companies that make the machines that LED manufacturers use.

LED technology is evolving quickly, with new generations of devices becoming available every four to six months, according to a DOE report. LED performance is improving more rapidly than the department had projected, Sommers said.

"Ten years ago, we didn't have white LEDs," he said. "The first white LEDs cost a dollar per lumen. Now, it's a penny or less."

The Energy Independence and Security Act of 2007, which set efficiency standards for light bulbs, is also helping to promote LED use. Traditional incandescent bulbs do not meet the standards that go into effect in 2012, Brodrick said. By 2020, he said, advanced incandescents will fall below the standards as well.

"Only CFLs and LEDs are likely to meet the (2020) standards," Brodrick said. "Incandescents are going to disappear from the shelves."

GE estimates that there are four billion sockets in the United States, Sommers said. "We'd like to put our bulbs into them." ▲

---

Tom Price (ThePricesWrite@yahoo.com) is a Washington-based journalist who focuses on government, politics, technology, business and education.