

Study: LED Bulbs Pose Health Hazard

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By: Sameea Kamal
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IRVINE, Calif. — A recent study published by University of California researchers found that LED light bulbs considered environmentally preferable to traditional light bulbs contain lead, arsenic and a dozen other potentially hazardous substances, according to newly published research.

“LEDs are touted as the next generation of lighting. But as we try to find better products that do not deplete energy resources or contribute to global warming, we have to be vigilant about the toxicity hazards of those marketed as replacements,” said Oladele Ogunseitan, chair of UC Irvine’s Department of Population Health & Disease Prevention, who led the study.

By crunching, leaching and measuring the tiny multicolored lightbulbs sold on Christmas strands, traffic lights, and car headlights and break lights, Ogunseitan and fellow scientists from UCI and UC Davis found that low-intensity red lights contained up to eight times the amount of lead allowed under California law. In general, high-intensity, brighter bulbs had more contaminants than lower ones — white bulbs contained the least lead, but had high levels of nickel, the university released in a statement.

“We find the low-intensity red LEDs exhibit significant cancer and noncancer potentials due to the high content of arsenic and lead,” the team reported in the January 2011 issue of *Environmental Science & Technology* in regard to the holiday lights.

A study of larger LED systems such as household overhead room lighting or bedside lamps is currently undergoing peer-review and will be published later, but Ogunseitan said the patterns are more of the same.

The university states that lead, arsenic and many additional metals discovered in the bulbs or their related parts have been linked in hundreds of studies to different cancers, neurological damage, kidney disease, hypertension, skin rashes and other illnesses. The copper used in some LEDs also poses an ecological threat to fish, rivers and lakes.

While breaking a single light and breathing fumes would not automatically cause cancer, Ogunseitan said it could be a tipping point on top of chronic exposure to another carcinogen.

The study found that risks are present in all parts of the lights and at every stage during production, use and disposal, according to the statement.

For the past ten years, Ogunseitan and his team have been researching ways to make electronic products less damaging on the environment and to human health during their use and disposal, funded in large part by the National Science Foundation.

About three years ago, the team broadened their scope of research to include alternative assessments for high volume products as part of a new Research and Education in Green Materials program.

“As the technology for electronics evolved from cathode ray tubes which had high amounts of lead to flat panel displays, we thought that we should anticipate the solid waste stream by researching the components of newer technologies,” Ogunseitan said. “Light-Emitting Diodes seemed to be the newest and latest components of such products.”

The research was also motivated by the fact that LEDs are used in many household appliances and consumer products, including products aimed at children like LED pacifiers and rubber ducks, he said.

Ogunseitan said there had been no previous studies on whether LEDs should be categorized as hazardous waste either at the federal or state levels.

Ogunseitan cautioned consumers, manufacturers and first responders to accident scenes to take care when handling the light bulbs.

When bulbs break at home, residents should sweep them up with a special broom while wearing gloves and a mask, and crews dispatched to clean up car crashes or broken traffic fixtures should don protective gear and handle the material as hazardous waste, he advised.

LEDs are not currently classified as toxic and are disposed of in regular landfills. Ogunseitan has forwarded the study results to California and federal health regulators, the university reports.

Ogunseitan cites LEDs as an example of the need to mandate product replacement testing. Although diodes are widely hailed as safer than compact fluorescent bulbs, which contain dangerous mercury, they weren't properly tested for potential environmental health impacts before being marketed as the preferred alternative to inefficient incandescent bulbs, now being phased out under California law, he said.

California Assembly Bill 1879, which would have required advance testing of replacement products, was originally scheduled to go into effect on Jan. 1 but was opposed by industry groups, according to the university.

A less stringent version was substituted, and Gov. Arnold Schwarzenegger placed the law on hold days before he left office, according to the statement.

"I'm frustrated, but the work continues," said Ogunseitan, a member of the state Department of Toxic Substances Control's Green Ribbon Science Panel.

He added that makers of LEDs and other items could easily reduce chemical concentrations or redesign them with truly safer materials.

"Every day we don't have a law that says you cannot replace an unsafe product with another unsafe product, we're putting people's lives at risk," he said. "And it's a preventable risk."

"I am very passionate about energy efficiency, and I think LEDs are a step in the right direction, but we should be very careful not to add to the toxicity risks that are already almost overwhelming for people and the environment from consumer products disposal," he said. "I hope that we still have time before the lighting bulb regulation takes effect, to encourage manufacturers of LEDs to use materials that will not put the burden on consumers to avoid toxic exposures or to figure out how to dispose of hazardous waste generated by LEDs."

Ogunseitan said any potential replacement testing bills and regulations also have to recognize that public participation is essential, and that it is important to have national, uniform standards for energy savings, as well as in reducing toxic exposures to people and the environment.

The researcher said LEDs deserve particular attention because they are used in a wide variety of products not necessarily related to energy efficiency. These "novelty items" are more likely to have shorter life spans than household lighting fixtures and are more likely to be disposed of inappropriately, he said.

"This study brings unfortunate news to those of us working in the design industry who are caught between the competing demands of making environments as healthy and energy efficient as possible," said Mark Donahue, vice president and design director of HKS Architects, a global architectural design firm that aims to make buildings as carbon-light as possible. "LED lighting has held out great promise as a low energy alternative to high-intensity discharge and fluorescent lighting, and the fact that they generate very little heat is an added benefit."

Donahue said that while sustainable design has become more recognized, both the economic and environmental full life-cycle costs have come to assume a more important role in the discussion.

"I haven't had the opportunity to examine the UC Irvine study first hand, but green practitioners are always concerned when the byproducts of manufacture and disposal of building materials produces toxics," he said.

He added that one of the major advantages of LEDs, even with potentially harmful substances, is that because of their long-lasting life spans, the volume of material that ends up being disposed of is reduced.

“My sincere hope is that manufacturers of LED bulbs can find a way to reduce or remove the toxic substances from their products, because there really isn't anything on the horizon that offers the same kind of energy and operational benefits,” Donahue said.

AJ Rounds, founder of a LED light bulb manufacturing franchise, said that while he was aware of the tremendous amount of mercury in compact fluorescent bulbs, hearing about the hazardous substances in LEDs was new information.

Rounds recently liquidated the company, citing the industry's volatility and high expenses, among others.

“(LEDs are) not ready for release, that's still another year or two out,” he said. “There are some applications where it's really good, but others where it's just not there yet.”

His company sold a variety of LED lights, from indoor appliances to outdoor uses.

“I think LED is the future of light, it's only be a matter of time before LED is in everything,” he said. “But the economy we're in and the state of nation really thwarts progress because the public is focusing on other issues. Not going green, but trying to make it day to day.”