

# Let There Be Light

Incandescent or fluorescent?

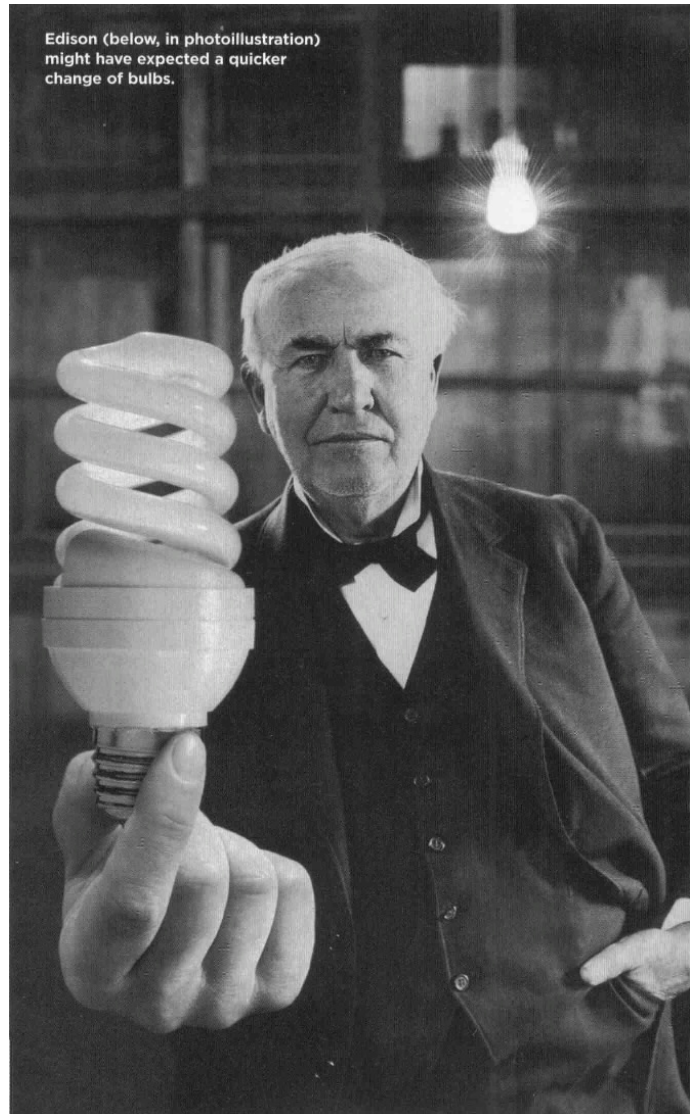
What would Edison do? **BY RICHARD CONNIFF**

**L**ive long enough, and technologies that once seemed immortal fade into oblivion, often taking a piece of your heart with them: the 45 rpm record, the transistor radio, photographic film, a typewriter left at the curb to be anointed by passing dogs. The case that brings this gloomy thought to mind probably isn't going to hurt as bad as finding your old copy of Led Zeppelin's *Houses of the Holy* LP growing mold in your parents' basement. Still, there's always something poignant when a pear-bodied vestige of our past gives way to a younger rival once dismissed as clunky and cold, and now revealed in a slimmer, smarter, sexier new form.

I am talking about the impending demise of the incandescent light bulb, at the hands of the compact fluorescent lamp (or CFL). After roughly 125 years as one of the most familiar objects in our lives, providing a simple, dependable, relatively cheap source of light (and fodder for an entire genre of jokes), the incandescent bulb has lately become the bane of everyone who worries about global warming. Even its admirers concede that it's an energy hog, converting less than 10 percent of the electricity it uses into light. (The other 90-odd percent goes to waste as heat.) And since much of that wasted electricity comes from dirty coal-fired power plants, this adds up to a lot of needless greenhouse gas emissions.

The CFL's admirers say it is not only far more efficient and cooler, both literally and figuratively, but also lasts about ten times longer (although it doesn't last as long if you turn it on and off too often). Put a CFL in place of a 60-watt incandescent bulb, and you save about \$30 in electrical costs alone over the life of the CFL. More important, you avoid over 80 pounds of greenhouse gas emissions annually. And if every household in the country made the switch in just one socket, it would be the global warming equivalent of yanking 800,000 cars off the road, according to Richard Karney, an official with federal Energy Star program, which promotes energy efficiency.

Hence the strange spectacle of environmentalists advising people that they can help save the world by taking perfectly good, working light bulbs and throwing them in the trash. Religious organizations have also begun to advocate ditching the incandescent bulb as a moral cause. (A coalition of synagogues and environmental activists has organized its campaign under the slogan, "How many Jews does it take to change a light bulb?") Australia, formerly a global warming skeptic, has actually banned incandescent light bulbs,



Edison (below, in photoillustration) might have expected a quicker change of bulbs.

beginning by the end of the decade; the European Union has voted to follow suit, and California is considering a ban. But the most powerful force pushing the incandescent bulb over the cliff is undoubtedly Wal-Mart, the largest retailer on earth, which has adopted CFLs “with the zealotry of a convert,” as the New York Times recently put it, and set a goal of boosting U.S. sales from 40 million to 100 million a year. Since there are only about 110 million households in the country, that would just about accomplish Karney’s hypothetical 800,000-car scenario in one fell swoop.

OK, a little perspective: the incandescent bulb still accounts for about 85 percent of the two billion bulbs sold annually in the United States. So predictions of its demise are perhaps wishful. But despite growth in housing, incandescent sales recently began a notable decline. Meanwhile, CFL sales have more than doubled. Thomas A. Edison, who demonstrated his first incandescent test model in 1879 in New Jersey (which is now debating a ban in government buildings), would see which way the wind is blowing.

He would also probably understand all the nasty things people are saying about what he considered his greatest invention. He once bad-mouthed gas, his chief rival in the illumination game, as “almost entirely heat and only incidentally a little light,” not to mention being “evil” and a source of “vile poison.” Then, piling it on a bit, he described gas as traveling through “an immense system of sewerage pipes,” escaping “through holes into our apartments” and supplanting oxygen with sulfuric acid and other “reeking” impurities, all for a “nauseous, dim flicker.”

So much for the romance of gaslight.

What would probably surprise Edison is that his invention is still around 125 years later. From a standing start in August 1878, it took his laboratory just over a year to solve the problems that had hindered development of the incandescent bulb through the previous 40 years of tinkering by other inventors. He demonstrated the success of his work with typical panache, on a stormy New Year’s Eve, 1879, by illuminating his laboratory in Menlo Park (now Edison), New Jersey, with more than 50 incandescent bulbs. Hundreds of people came by train to witness the spectacle of these glass bubbles glowing, almost miraculously, without smoke, smell or sound.

Thus the age of electric light was born and, with a few modest improvements, it has spread around the world largely on the basis of Edison’s incandescent bulb. It would be hard to overstate how profoundly this invention, and Edison’s simultaneous development of a system of electrical distribution, changed society, freeing home and work lives from the natural limits of darkness. Even today in developing regions, the arrival of the light bulb often leads to a decline in the birthrate and the expansion of literacy.

But pride of ownership aside, Edison would surely expect somebody else to have come up with a better bulb by now. And of course someone has. The reason more people don’t know it is that the compact fluorescent lamp was such a stinker in its first incarnation, after the energy crisis of the 1970s. Whereas the modern CFL typically looks like a swirl of ice cream, with a playful air bordering on insouciance, early CFLs were big, expensive and blocky. They looked as if they’d been designed by architects from the Soviet School of Collective Misery, and they gave off a ghastly cold light. The one thing to be said for them, apart from energy efficiency, was that they seemed to last forever, even if you wished they wouldn’t. (I still have some imprisoned in my cellar, where they cling fiercely to life.) The memory of that experience, combined with the relative complexity of choosing the right CFL, has discouraged many people from making the switch.

“I made a lot of mistakes along the way,” says Erica Rowell, a writer and editor at Environmental Defense, who purged incandescent bulbs from her New York City apartment last year. Rowell was putting together what is now the best CFL guide on the Internet (you can find it at [environmentaldefense.org/go/cflguide](http://environmentaldefense.org/go/cflguide)) and ran into the same problems other consumers face. “Most Web sites didn’t answer the question I had, which was: Which are the good ones?” she said. She didn’t know that the warmest light occurs at around 2,700 to 2,850 degrees Kelvin. “So a couple of the ones I bought had a bluer, colder-looking light. And then I knew, ‘Never buy these again.’ I put them in the closets.” She also didn’t know that there are three different technologies for producing light after you flip the switch, one instant and “the others not so instant.” The Environmental Defense Web site now contains full product information on about 50 CFLs, including ones that work with dimmers and three-way lamps.

Rowell says the product labeling on CFLs still often omits the kind of information that consumers need, such as the Kelvin rating. So she suggests three simple shortcuts: first, look for the words “warm white.” (That will guarantee a color-rendering index that won’t make a woman look as if she applied her makeup after a round of banana daiquiris at Tammy Faye’s house.) Second, start by buying just one CFL, to see if you like that particular product. And third, stick with CFLs that carry the federal Energy Star label, which assures efficiency durability and consistency. CFLs tend to be more expensive than incandescent bulbs, but the extra cost gets paid back in lower electric bills within six months. For years (and years) after that, they save money.

In truth, once you get past the initial anxiety, the CFL looks almost too good to be true. It’s like the long-lasting light bulb that, according to cultural lore, Big Business would never let us have because it would cut into both power company profits and future light bulb sales. It’s like Byron the Bulb, whose unusual longevity in Thomas Pynchon’s 1973 novel *Gravity’s Rainbow* caused alarm in “the Phoebus Surveillance Room,” a vault deep beneath the Alps where “a cadre of super-clean white-robed watchers” wandered “meter to meter, light as snow-devils,” making sure that all light bulbs died more or less on schedule. When Byron passes 1,000 operating hours, still going strong, the Phoebus cartel sends out a hit man. (I assumed that the Phoebus cartel was the stuff of fiction, or conspiracy theory paranoia. But until a US. antitrust action in the late 1930s, light bulb manufacturers did in fact conspire to control prices and, some critics say, impede development of longer-lasting bulbs. Outside of Pynchon, though, there is no evidence of light bulb hit men, nor of mysterious strangers offering large sums to buy back light bulbs that have exceeded their normal life span.)

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So is the CFL perfect? And is this the end of the incandescent light bulb? Hal Wallace, a curator of the electrical collection at the Smithsonian’s National Museum of American History scoffs. “Inventors immemorial have made multiple predictions of the demise of the incandescent light bulb,” he says, “starting in Edison’s lifetime.” One of Edison’s own employees, Daniel MacFarlan Moore, may have been among the first. “What’s wrong with my light?” Edison is supposed to have asked, when Moore started to tinker with a replacement idea. And Moore undiplomatically replied, “It’s too small, too hot and too red.” He soon found employment elsewhere. Other predictions have followed, says Wallace, “any time there was a new technological breakthrough in the field of lighting.”

Not surprisingly, Jack Stanley, curator of the Thomas A. Edison Menlo Park Museum in Edison, New Jersey, also defends the incandescent bulb. “There’s always another side to the blade,” he says. “One hundred years ago everyone traveled by horse, and people complained about the pollution,” meaning manure in the streets. “Then cars came along and everybody said, ‘Great, no more pollution.’”

Likewise, there is a dark side to CFLs. Like other fluorescents, they contain a pollutant, about four milligrams of mercury per lamp. Steve DenBaars, a professor of material science at the University of California at Santa Barbara, does some quick calculations and concludes that this is about the same amount of mercury you would get in 100 cans of tuna fish. DenBaars is not suggesting that you eat your CFLs. Nor does this mercury normally get released into the environment. But four milligrams is “not nothing,” he says. “You don’t want to use CFLs for down lighting over kitchen counters. A champagne cork hits one, you’ve just dusted your whole kitchen with mercury.”

But it’s easy enough to handle CFLs with care and dispose of them safely, when they finally die, through local hazardous-waste collections or through CFL recycling programs. Meanwhile, you have avoided the much larger and less manageable mercury pollution that would have been produced by coal-fired electric plants to light an incandescent bulb. This makes the CFL “the only short-term solution, and it’s a big one,” says DenBaars. “I think it could cut energy use by 10 percent.” But the mercury issue is “also why we need to look at new technologies that can beat CFLs, and do it in a safer manner.”

DenBaars expects light-emitting diodes, or LEDs, to be cheap enough for widespread household use within four years. LEDs are already common in mobile phones and some flashlights, and where incandescent bulbs convert less than 10 percent of incoming energy into light, and CFLs manage 18 to 20 percent, LEDs boast a 40 percent conversion rate, without mercury or other contaminants.

So which bulb would Thomas Edison choose if he were alive today?

Given his ability to see problems on a global scale and his natural aversion to wasting coal, it's a safe bet that he'd be working under the light of CFLs and furiously developing a better LED. At the Menlo Park Museum, Jack Stanley says it's still possible to pay homage to Edison in a world without incandescent light bulbs: "Flying in a 747 is different from a ride in the Wright Flyer, but it's still flight. Credit should be given where credit is due, and the concept of electric light is mainly Edison's. He brought it to fruition; he made it practical. I can't think of anything that will hold out for 125 years unchallenged." Then, reaching a bit, he adds, "The only thing that will last longer is Edison's invention of the word 'hello' for answering the telephone."

But that, he concedes, is another story.

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