

## Department of Energy – Induction lighting is the best kept secret

# Induction Lighting: An Old Lighting Technology Made New Again

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Induction lighting is one of the best kept secrets in energy-efficient lighting. Simply stated, induction lighting is essentially a fluorescent light without electrodes or filaments, the items that frequently cause other bulbs to burn out quickly. Thus, many induction lighting units have an extremely long life of up to 100,000 hours. To put this in perspective, an induction lighting system lasting 100,000 hours will last more than 11 years in continuous 24/7 operation, and 25 years if operated 10 hours a day.

The technology, however, is far from new. Nikola Tesla demonstrated induction lighting in the late 1890s around the same time that his rival, Thomas Edison, was working to improve the incandescent light bulb. In the early 1990s, several major lighting manufacturers introduced induction lighting into the marketplace.

Despite its high initial cost, induction lighting has many superior characteristics, including the following:

- Virtually maintenance-free operation
- High efficacy—in many cases, 60+ or 70+ lumens per watt
- Long life
- Excellent [color rendering index](#) (CRI)—80+ and in some cases 90+
- Choice of warm white to cool white (2,700–6,500 K) [color temperature](#)
- Instant start and restrike operation
- No flickering, strobing, or noise
- Low-temperature operation
- Dimmable capability with some units
- High power factor: .90+

### Long Lifespan

Experience with using induction lighting at the U.S. Department of Energy's Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico, has demonstrated the long life in actual usage. WIPP's first induction lighting system was installed in 1998, replacing high-pressure sodium (HPS) lights. More than 10 years later, all but three of the original 36 induction units are still operating after more than 88,000 hours of continuous, 24/7 operation. Additional systems were installed in 2002 and succeeding years, both indoors and outside, with excellent results.

Having said that, there are some caveats. One induction bulb's rated life is only 15,000 hours and its output is only 1,100 lumens. It is a self-contained all-in-one screw-in unit that can directly replace a conventional incandescent or compact fluorescent bulb. This bulb targets different applications than those of most other induction lighting systems because of both its lower light output and shorter life.

Two of the top manufacturers of induction lighting systems have an average rated life of 100,000 hours, including the ballast. Some other manufacturers only rate their ballasts for 60,000 hours, even though the bulb may last longer. Check out the warranties before buying. Some manufacturers offer full five-year warranties on the entire induction lighting system. Others offer shorter warranties on some or all components.

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Although they may last 100,000 hours, after 60,000 to 100,000 hours of operation the initial lumen output of many of the induction lighting systems drops to 70%—the point where [relamping](#) is often recommended.

### Applications with High Potential for Induction Lighting

- In hard-to-reach locations that make maintenance costs high, such as street lighting and tunnels, or in high ceilings where there is continuous operation, such as hotel rotundas
- Cold environments, such as supermarket walk-in coolers and freezers
- Where high-quality lighting is required or highly desirable
- Where reliability is highly valued
- Where high lumen output is required
- In areas that require lamps to reach full illumination immediately.

### Saving More Energy with Innovative Controls

Some manufacturers are introducing innovative control strategies for additional energy savings.

Although most units cannot be dimmed, at least two systems allow for full dimming. One company has teamed with the University of California Lighting Technology Center at the University of California Davis campus to demonstrate a bi-level induction lighting system. This system has two brightness levels. In areas such as parking garages, the light remains at half brightness in the absence of occupants and moves to full brightness when an occupancy sensor shows the presence of someone entering the area. ([PDF 3.0 MB](#)).

### Utility Involvement in Induction Lighting

Utilities throughout the country are installing and/or promoting induction lighting. For example, many [Northwest public utilities](#) are offering incentives. One utility in New Jersey has a program offering municipal customers the opportunity to replace older mercury vapor street lighting fixtures with new induction lighting fixtures.

### Environmental Drawback

As do standard fluorescent bulbs, induction bulbs contain a small amount of mercury, although it is in a solid state that makes it less harmful in case of breakage. Nonetheless, [dispose of these bulbs](#) responsibly at the end of their service life like fluorescent bulbs because of the mercury content.

For additional information on induction lighting, see my two comments at the end of my [May 5, 2009 blog](#).

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