

US Light Bulb Standards Save Billions for Consumers But Manufacturers Seek a Rollback

Trump administration will soon announce plans

A revolution in lighting is sweeping through our homes and businesses as LEDs (light-emitting diodes) supplant older technologies. LEDs provide all the benefits of the old-fashioned Thomas Edison light bulbs while slashing costs for consumers. Yet the Trump administration will soon announce a decision that could stymie future progress.

National minimum energy efficiency standards for light bulbs, enacted by the US Congress and President Bush in 2007, helped spur the investments and market changes that have resulted in the low-cost, high-quality LEDs now widely available. Initial standards started taking effect in 2012, and in 2017 the Department of

Energy (DOE) widened the range of light bulbs that must comply with tougher standards, slated for 2020. The 2020 standards will expand the LED market, further reducing costs for consumers and ensuring that affordable LEDs will be widely available for all the types of bulbs commonly used in US homes.

These standards will deliver huge savings, given the scale of the lighting market — more than six billion sockets in US homes. They will save a typical household about \$180 per year by 2025. On a cumulative, national basis, consumers will realize more than \$665 billion in electricity bill savings by 2050.

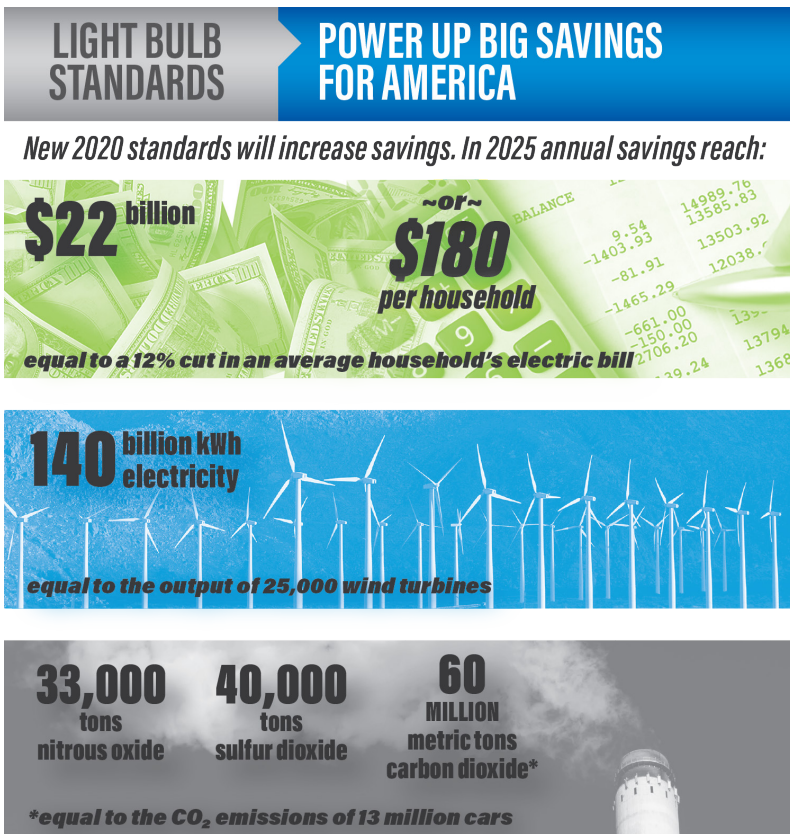


Figure 1. Light bulb standards by the numbers

Unfortunately, major light bulb manufacturers want to slow the pace of change. They are seeking to persuade the Trump administration to attempt an unlawful rollback of the 2020 standards. Such a rollback would waste energy and hurt consumers. This issue brief describes the status of the light bulb standards and how the market has responded to them. It provides up-to-date estimates of the savings from the light bulb standards and how much could be lost if the Trump administration attempts to roll them back. Appendices provide more in-depth background, the ASAP/ACEEE analysis methodology, and detailed results, including state-by-state savings estimates.

Americans save big with light bulb standards

US light bulb standards will save consumers more than \$5 billion on electricity bills this year alone. After 2020, when manufacturers and retailers must comply with standards that are both stronger than initial standards and apply to a wider range of bulbs, annual consumer electricity bill savings will grow, reaching about \$22 billion in 2025, or about \$180 for an average household. Total electricity savings top 140 billion kilowatt hours in 2025, roughly the amount generated by 45 large coal-fired power plants or 25,000 wind turbines in a year. By reducing the amount of fuel burned for electricity, the standards cut harmful emissions such as smog-forming nitrogen oxides (NO_x), sulfur dioxide (SO₂), and globe-warming carbon dioxide (CO₂). The result? Cleaner air and fewer respiratory problems such as childhood asthma attacks.

These savings really add up. Through 2050, consumers' electricity bill savings will total more than \$665 billion, and avoided CO₂ will total nearly 1,700 million metric tons (MMT). Savings don't only benefit consumers and the environment, they also boost the overall economy and employment as people spend their savings on other goods and services. ACEEE and ASAP estimate that domestic employment will be 115,000 jobs higher in 2025 due to the light bulb standards.¹

Standards unleashed light bulb innovation

For more than a century, the Thomas Edison-invented incandescent bulb used in US homes had barely changed. Then in 2007, Congress and President George W. Bush enacted the Energy Independence and Security Act, setting off a two-stage race to improve light bulb efficiency. In the first stage, A-type bulbs, the most common light bulb shape (see figure 1), needed to reduce power consumption by 25-30% compared to conventional incandescent bulbs. For stage 2, Congress directed the US Department of Energy (DOE) to develop a stronger standard for 2020 and to determine which additional light bulb shapes, sizes, and special categories would be covered. Instead of picking one lighting technology as the winner, Congress set standards that cover many ways of generating light and let the market decide which technologies to further develop to meet those efficiency levels. But because DOE had a history of missing its legal deadlines, the law included a protective "backstop" standard to give innovators and manufacturers a firm, long-term efficiency target of at least 65-70% savings. If DOE missed procedural steps required by Congress or failed to establish a standard that met a minimum savings threshold, the backstop standard would automatically be triggered.



Figure 2. An LED A-type bulb.
Source: Amazon.com

For stage 1, major light bulb manufacturers developed and introduced new lines of improved incandescent bulbs using halogen gas inside the bulb ("halogens") and other design improvements to compete against even more efficient compact fluorescent lamps (CFLs). But with an eye toward the stage 2 target, they and new companies (e.g., North Carolina-based Cree, Inc.) invested heavily in a new entrant in the race for bulb efficiency: LEDs.

1 Stickles, B. and J. Mauer, J. Barrett and A. deLaski. 2018. Jobs Created by Appliance Standards. Washington, DC: ACEEE; Boston: ASAP.



Figure 3: LED reflector, MR, globe, and candelabra bulbs. Sources: 1000bulbs.com and bulbs.com

In part due to later restrictions placed by Congress, DOE did not meet the statute's timetable, and the backstop has been triggered. However, as required by Congress, DOE did complete rules to define the scope of bulb types covered by the backstop standard.

In addition to A-type bulbs, the 2020 standards apply to reflectors (cone-shaped bulbs used in recessed ceiling light fixtures and track lights), globe-shaped bulbs, 3-way bulbs, and many decorative ones. Figure 2 shows LED versions of some of the more common bulbs

LEDs: A great deal for consumers

LEDs have plummeted in price and now cost as little as a dollar more than a comparable halogen bulb. Because LEDs last much longer than halogen bulbs, a consumer switching to LEDs will spend less on light bulbs over time. For example, as shown in the table, over a 10-year period, a typical consumer will spend \$2.37 on a 60W-equivalent A-type LED bulb but \$11.92 on a comparable halogen. And that's just the bulb costs. When electricity costs are factored in, that same consumer would spend a total of nearly \$60 over 10 years if he/she chose halogen bulbs but less than \$12 for an LED – a savings of nearly \$50. Because many LEDs last longer than 10 years, the longer-term savings may be even greater. As shown in the table, other LED bulb types are also a great deal for consumers. Their 10-year savings range from about \$38 to \$92. As stronger standards covering more bulb types kick in as of 2020 and production scales up, LED prices are likely to become even more favorable.

| Bulb type | Manufacturer | Bulbs | | | Electricity | | | 10-year total cost | 10-year total savings with LED |
|----------------------------------|-----------------|--------------|--------|--------------|-------------|----------|--------------|--------------------|--------------------------------|
| | | Technology | Price | 10-year cost | Watts | kWh/year | 10-year cost | | |
| A-type (60W equivalent) | EcoSmart | Halogen | \$1.49 | \$11.92 | 43.0 | 36.1 | \$46.93 | \$58.85 | \$47.20 |
| | EcoSmart | LED | \$2.37 | \$2.37 | 8.5 | 7.1 | \$9.28 | \$11.65 | |
| A-type (100W equivalent) | EcoSmart | Halogen | \$1.49 | \$11.92 | 72.0 | 60.4 | \$78.58 | \$90.50 | \$68.51 |
| | EcoSmart | LED | \$5.62 | \$5.62 | 15.0 | 12.6 | \$16.37 | \$21.99 | |
| Globe (G25, 40W equivalent) | Sylvania | Incandescent | \$2.47 | \$12.35 | 40.0 | 24.8 | \$32.27 | \$44.62 | \$38.09 |
| | EcoSmart | LED | \$3.30 | \$3.30 | 4.0 | 2.5 | \$3.23 | \$6.53 | |
| Reflector (BR30, 65W equivalent) | Philips/Signify | Incandescent | \$3.49 | \$20.94 | 65.0 | 68.8 | \$89.44 | \$110.38 | \$92.59 |
| | Cree | LED | \$6.78 | \$6.78 | 8.0 | 8.5 | \$11.01 | \$17.79 | |

Notes: EcoSmart is the Home Depot house brand for light bulbs. All LED bulbs are ENERGY STAR® qualified and dimmable. Non-ENERGY STAR and non-dimmable versions are less expensive. All bulb prices were obtained from HomeDepot.com on 6/8/2018 for single bulbs sold in multi-packs of 2-6 bulbs. Annual electricity use assumes daily operating hours for A-type, globe, and reflector bulbs of 2.3 hours/day, 1.7 hours/day, and 2.9 hours/day, respectively. Rated lifetimes for the halogen A-type, incandescent globe, and incandescent reflector bulbs are 1,100 hours, 1,500 hours, and 2,000 hours, respectively. The LEDs have rated lifetimes of at least 15,000 hours. Electricity costs assume an electricity price of 13 cents/kWh.

that must meet the 2020 standards, including clear versions with exposed filaments. Any technology can comply, but with the popularity of LEDs for A-type bulbs, manufacturers have stopped investing in further improvements to incandescent bulbs. They have even begun phasing out CFLs.

LEDs are winning the race for the A-type bulb market. The stage 2 standards will lock in those savings. They will also expand the race and resulting savings to a wider range of light bulb sizes and shapes used in Americans' homes.²

Manufacturers lobby for a rollback that would slow progress and slash savings

Manufacturers supported the original 2007 law. Now, however, the three largest lighting companies –GE, Signify (formerly known as Philips Lighting), and Sylvania, as represented by their trade association, the National Electrical Manufacturers Association – are lobbying against implementation of the backstop. They want to change the rules of the race. They contend that DOE still has a choice about whether to implement the backstop. In its place, they are lobbying for DOE to leave the stage 1 standards in place for halogens and impose tougher standards only for LEDs. In other words, they want a race where each technology gets a different finish line, some of which have already been crossed. Manufacturers could keep on selling their current highly profitable halogen bulbs and, for some of the additional bulb shapes and sizes not covered by stage 1, even conventional incandescent product lines.

The manufacturers' proposed rollback could potentially eliminate all of the savings from the stage 2 standards, slowing the transition to energy-efficient lighting and hurting consumers. The average household would lose up to \$115 in electricity bill savings in 2025. On a national, cumulative basis, consumers would lose more than \$340 billion by 2050. Millions of tons of pollutants would be needlessly added to the atmosphere.

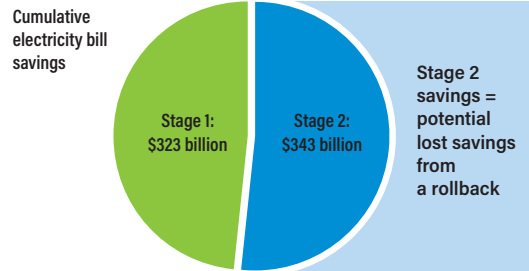


Figure 4. The cost of a potential rollback.

Manufacturers may have found a willing ear in the Trump administration. In summer 2017, DOE reached a legal settlement with the National Electrical Manufacturers Association. The terms of the settlement, which call for DOE to propose new rules in 2018, suggest that the administration may attempt to carry out the manufacturers' rollback wishes.

A rollback would break the law

Fortunately, the national appliance standards law forbids rollbacks. It prohibits DOE from weakening standards. Because the 2020 backstop has been triggered, any subsequent standard cannot be weaker or narrower in the range of light bulbs covered. An attempt by the Trump administration to substitute a weaker or less-comprehensive standard or to simply assert that the backstop standard does not apply will almost assuredly lead to lawsuits. The 2007 law provides another important layer of protection: state Attorneys General can step in to enforce federal light bulb standards. Legal action against manufacturers or retailers that fail to comply may prove the most effective way to guarantee the large savings from the light bulb standards. If the Trump administration attempts to formally roll back the standards or fails to enforce them, the courts will decide the standards' future and whether Americans will receive the resulting benefits.

Appendices available at <https://appliance-standards.org/document/gsl-methodology>

ASAP | APPLIANCE STANDARDS AWARENESS PROJECT

ACEEE
American Council for an Energy-Efficient Economy