REPORT SUMMARY:

Energy Savings Forecast of Solid-State Lighting in General Illumination Applications

The complete *Energy Savings Forecast of Solid-State Lighting in General Illumination Applications* and interactive tool is available at energy.gov/eere/ssl/led-lighting-forecast.

The U.S. Department of Energy (DOE) has developed a comprehensive strategy to accelerate the development and market introduction of energy-efficient solid-state lighting (SSL) for general illumination. The U.S. will benefit by focusing its resources and maintaining its global leadership in this technology, which has significant energy-saving potential.

The DOE report *Energy Savings Forecast of Solid-State Lighting in General Illumination Applications* estimates the energy savings of light-emitting diode (LED) white-light sources compared to conventional white-light sources (i.e., incandescent, halogen, fluorescent, and high-intensity discharge) over the analysis period of 2013 to 2030. Using an econometric model of the U.S. lighting market, annual lighting energy consumption is projected under a **Reference Scenario** that examines the growing market presence of LEDs if current trends in LED price and performance continue. This **Reference Scenario** is compared to the energy consumption under a **No-LED Scenario** that hypothesizes no additional market penetration of LEDs beyond current levels. The difference in energy consumption between these two scenarios provides an indication of anticipated energy savings that can be attributed to LED lighting going forward.

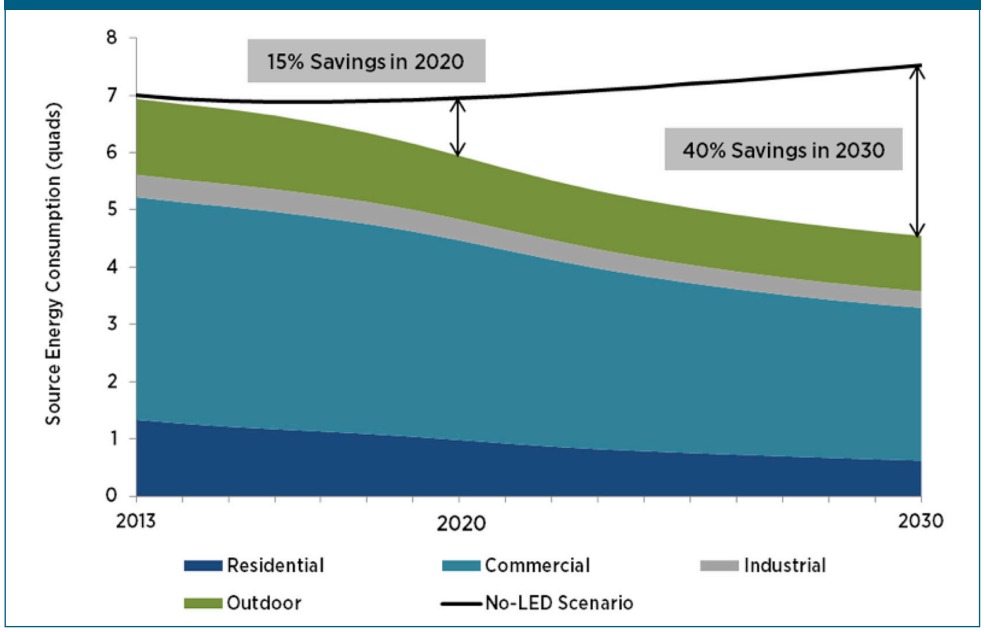
The econometric lighting market model relies on assumptions of projected LED and conventional technology efficacy, retail price, and operating life. These inputs are based on work conducted collaboratively between DOE and industry experts, including members of the Next Generation Lighting Industry Alliance, an SSL technical working group managed by the National Electrical Manufacturers Association.

Key Results

The forecast indicates that LED lighting in general-illumination applications will reduce U.S. lighting energy consumption by nearly one-half in 2030. In addition:

- LED lighting is projected to gain significant market penetration. It is expected to represent 48% of lumen-hour sales of the general-illumination market by 2020, and 84% by 2030.
- LEDs are projected to reduce lighting energy consumption by 15% in 2020 and by 40% in 2030—saving 3.0 quads (261 terawatt-hours, or TWh) in 2030 alone, worth over $26 billion in savings at today's energy prices and equivalent to the total energy consumed by nearly 24 million U.S. homes today. Assuming the current mix of generating power

Total U.S. lighting energy consumption forecast, 2013–2030



stations, these energy savings would reduce greenhouse gas emissions by approximately 180 million metric tons of carbon dioxide.

- The cumulative energy savings over the No-LED Scenario during the period from 2013 to 2030 would be 25.3 quads (2,216 TWh), equal to over $220 billion in avoided electricity costs.

The graph below depicts an additional scenario, one in which DOE's ambitious goals for LED price and efficacy are realized in all LED lighting products.

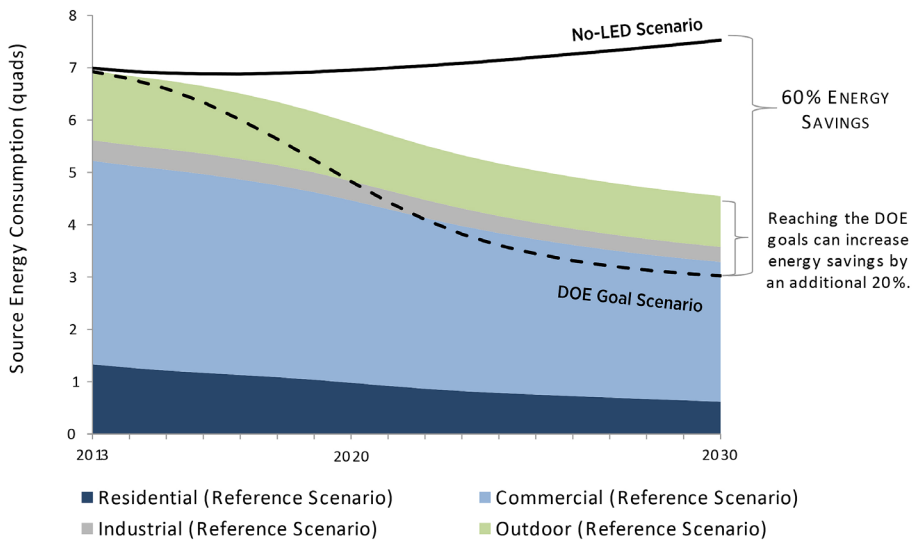
- In this **DOE Goal Scenario**, LED lighting would achieve a market share of 68% of lumen-hour sales in 2020 and over 90% in 2030. This would result in an additional energy savings of 20% in 2030 over the **Reference Scenario**, and thus a 60% decrease (1.5 quads, or 130 TWh) in total lighting energy consumption compared to the **No-LED Scenario**.
- In the **DOE Goal Scenario**, the cumulative energy savings over the **No-LED Scenario** during the period from 2013 to 2030 would increase to nearly 44 quads (3900 TWh), equal to over $380 billion in avoided electricity costs.

An Interactive Online Tool

An online interactive model allows interested users to adjust four key input variables—LED price decline, LED efficacy improvement, increased use of automated controls enabled by LEDs, and renovation rate—to better understand how changes in these variables affect the forecasted LED penetration and energy savings. The interactive model and the full report are both available at energy.gov/eere/ssl/led-lighting-forecast.

To learn more about DOE Solid-State Lighting program activities, visit www.ssl.energy.gov.

Forecasted LED lighting energy savings if DOE goals are realized



For more information
To learn more about the DOE Solid-State Lighting Program, see ssl.energy.gov

DOE/EE-1134 • September 2014