# History of Lighting

Technological advances in lighting | Changes in federal regulations

**1879**
Thomas Edison's 15-lm/W electric incandescent bulb becomes commercially available

**1962**
Nick Holonyak Jr. invents the red LED lamp

**1973**
Energy crisis spurs research in improving efficiency of light bulbs; CFLs introduced

**1979**
Blue LEDs developed but not cost-effective; lighting included in DSM programs

**1985**
CFLs become commercially available

**1993**
Blue LEDs become commercially available; paves way for white LEDs

**2007**
Congress passes the Energy Independence and Security Act (EISA):
- Covers mostly A-lamps
- Reduces energy consumption of 40- to 100-W lamps by 27% by 2014
- 22 lamp types exempt
- Minimum efficacy level of 45 lm/W enforced

**2008**
Residential LED lamp for 25- to 40-W equivalent hits the market

**2011**
Philips wins the DOE's L Prize Competition; LEDs become commercially available; average LED efficacy is 64 lm/W by mid-2011

**2012**
LED lamps introduced in DSM programs

**2012**
EISA Phase I goes into effect:
- Prohibits import and manufacture of inefficient GSLs
- Covers GSLs between 310 and 2,600 lm
- Phases out 100-W incandescent lamps

**2013**
Average LED efficacy is 70 lm/W; LED prices drop

**2013**
EISA Phase II framework released:
- Light bulbs should be 60% to 70% more efficient than incandescent lamps
- Phases out 75-W incandescent lamps

**December 2014**
Average LED efficacy is 72 lm/W

**December 2014**
60- and 40-W incandescent lamps phased out

**December 2015**
Average LED efficacy is 78 lm/w

**March 2016**
The DOE proposes standards for GSLs:
- Sets high standard for LEDs/CFLs
- Incandescent/halogen lamps will need to meet backstop starting in 2020

**October 2016**
The DOE expands GSL definition:
- Includes incandescent/halogen
- Removes seven exemptions

**December 2016**
Average LED efficacy is 91 lm/W

**December 2016**
The DOE expands GSL definition:
- Includes 7 of the original 22
- Covers all lamp technologies between 310 to 3,300 lm

**March 2017**
NEMA files a lawsuit against the DOE to challenge EISA regulations

**January 2018**
California puts EISA Phase II into effect

**2020**
Projected LED efficacy is 102 lm/W

**2020**
EISA Phase II may go into effect in all other states:
- Prohibits import, manufacture, and sale of inefficient GSLs
- LEDs may be the new baseline

Because of NEMA's lawsuit, the fate of Phase II is uncertain; other changes may occur before it fully goes into effect

**Notes:** DOE= US Department of Energy; DSM = demand-side management; GSL = general service lamp; lm = lumen; lm/W = lumens per watt; W = watt.

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CSM-1700001-005