

# Glossary:

L.E.D. = Light Emitting Diode: a semiconductor device, as are computer chip and PV cell.

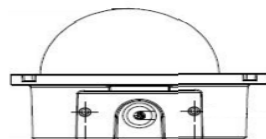
Lumen = unit of visible light power (output)

Watt = unit of power (input)

LPW = lumen per watt = unit of efficiency (could be bulb or fixture)

Color Temperature (CCT) = (simplified:) “cool” ~5000K / “neutral” ~4000K / “warm” ~3000K

This session:  
is not a training.  
is geared for energy professionals.



# Resources:



**CALiPER Program**  
Commercially Available LED Product Evaluation and Reporting



U.S. DEPARTMENT OF **ENERGY** | Energy Efficiency & Renewable Energy



**Illuminating**  
ENGINEERING SOCIETY



**ENERGY STAR® Program Requirements  
Product Specification for Lamps (Light Bulbs)**

**Eligibility Criteria  
Version 1.0**

**ENERGY STAR® Program Requirements  
for Luminaires**

**Partner Commitments**

# The Lighting Consumer's Conundrum

Thursday, March 10, 2016

1:30 pm - 2:30 pm

## **Speakers:**

Taylor Jantz-Sell

Jim Yorgey

## **Moderator:**

Fred Davis

# ***Fred Davis Corporation Efficient Lighting Specialists***

**FRED DAVIS  
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Efficient Lighting Since '83  
Wholesalers Nationwide

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# Retail Study

800 Lumen Category (60 W Equivalent)



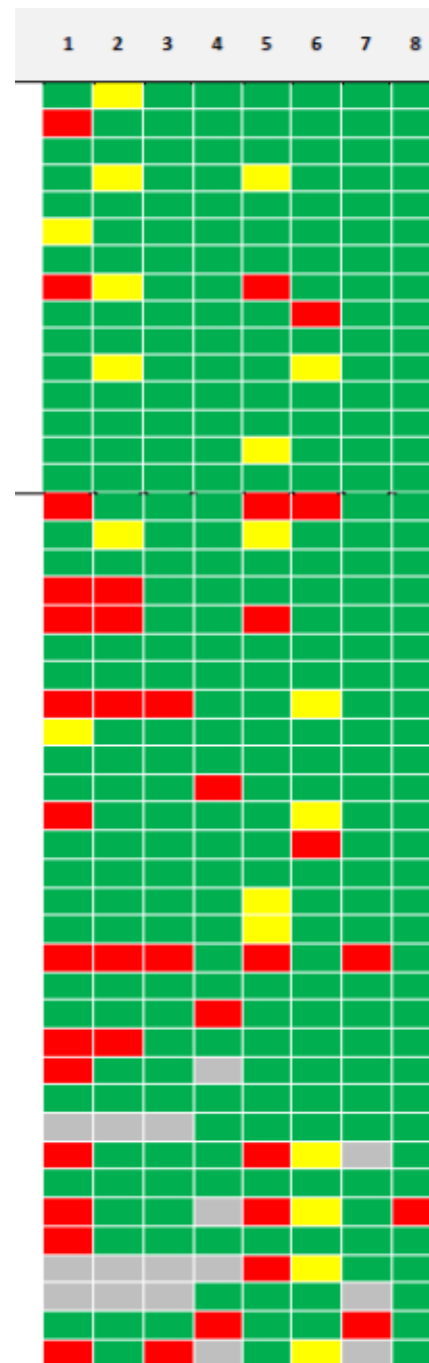
1,100 Lumen Category (75 W Equivalent)



1,600 Lumen Category (100 W Equivalent)



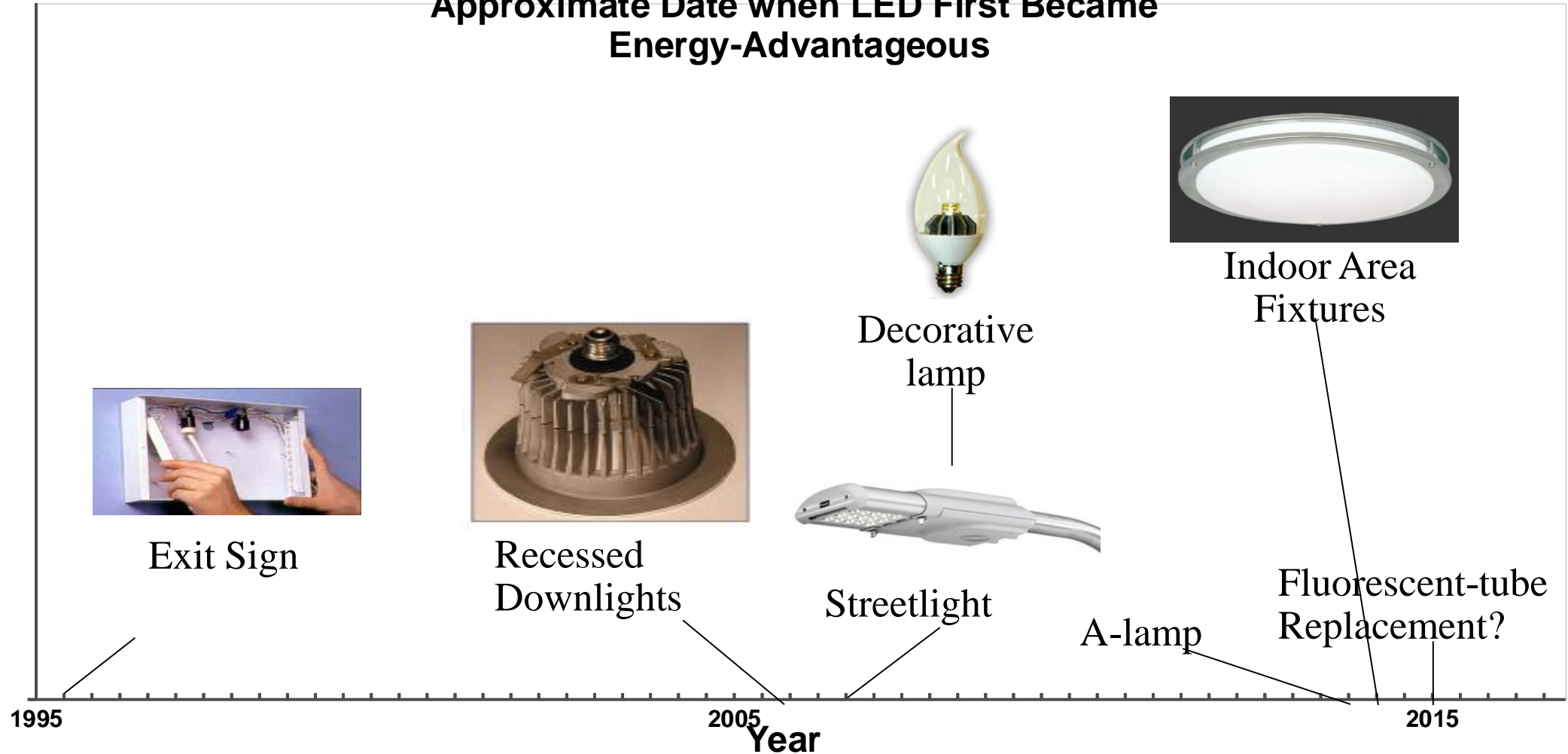
Huge improvement:  
2010-2011-2013



- Equivalency Claim: Lumen Output (A19) or CBCP (PAR30 or MR16)**
  - Red: Emitted less than 95% of the appropriate lumen output<sup>19</sup> (A19/A21), or emitted less than the allowable value of the ENERGY STAR equivalency tool (PAR30, MR16)
  - Yellow: Emitted between 95% and 100% of the appropriate lumen output (A lamps)
  - Green: Exceeded the appropriate lumen output (A lamps) or CBCP (PAR30, MR16)
- Equivalency Claim: Luminous Intensity Distribution**
  - Red: Did not have the same distribution as the benchmark products (e.g., semi-directional instead of omnidirectional, directional lamp with beam angle over 100°); deviation greater than 50% at a given vertical angle
  - Yellow: Some deviation (greater than 30% at a given vertical angle) from the benchmark distribution
  - Green: Closely approximated the distribution of the benchmark product
- Equivalency Claim: Color Quality (CRI, CCT, and D<sub>uv</sub>)**
  - Red: Had a CRI less than 79, CCT above 3500 K, or D<sub>uv</sub> outside ANSI tolerances (±0.006)
  - Green: Had a CRI of 79 or above, a nominal CCT of 2700 K or 3000 K, and a D<sub>uv</sub> within ANSI tolerances (±0.006)
- Equivalency Claim: Size**
  - Red: Exceeded ANSI tolerances for diameter or length by more than 5%.
  - Green: Met or was within both diameter and length tolerances established by ANSI
- Manufacturer Data: Lumen Output**
  - Red: Emitted less than 90% of the listed lumen output
  - Yellow: Emitted more than 110% of the listed lumen output
  - Green: Emitted between 90% and 110% of the listed lumen output
- Manufacturer Data: Input Power**
  - Red: Drew more than 110% of the listed input power
  - Yellow: Drew less than 90% of the listed input power
  - Green: Drew between 90% and 110% of the listed input power
- Manufacturer Data: Beam Angle**
  - Red: Was not omnidirectional or exceeded ANSI tolerances for listed beam angle
  - Green: Emitted light in all directions ("Omni") or was within ANSI tolerances for listed beam angle
- Manufacturer Data: Color Quality (CRI, CCT)**
  - Red: CRI was more than 10% different from listed value; nominal listed CCT was not accurate
  - Green: CRI was less than 10% different from listed value; nominal listed CCT was accurate

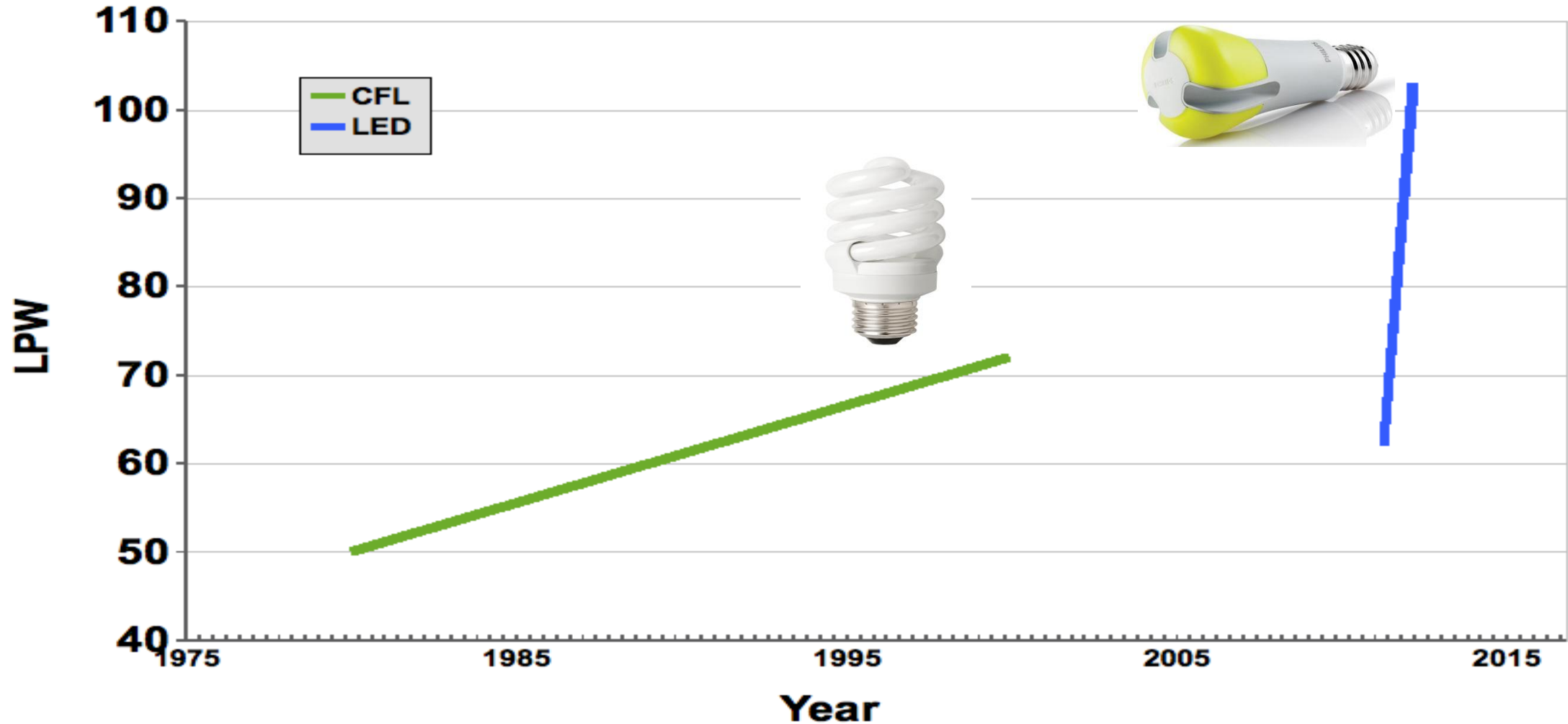
# History of LED Fixture Advances

Approximate Date when LED First Became Energy-Advantageous



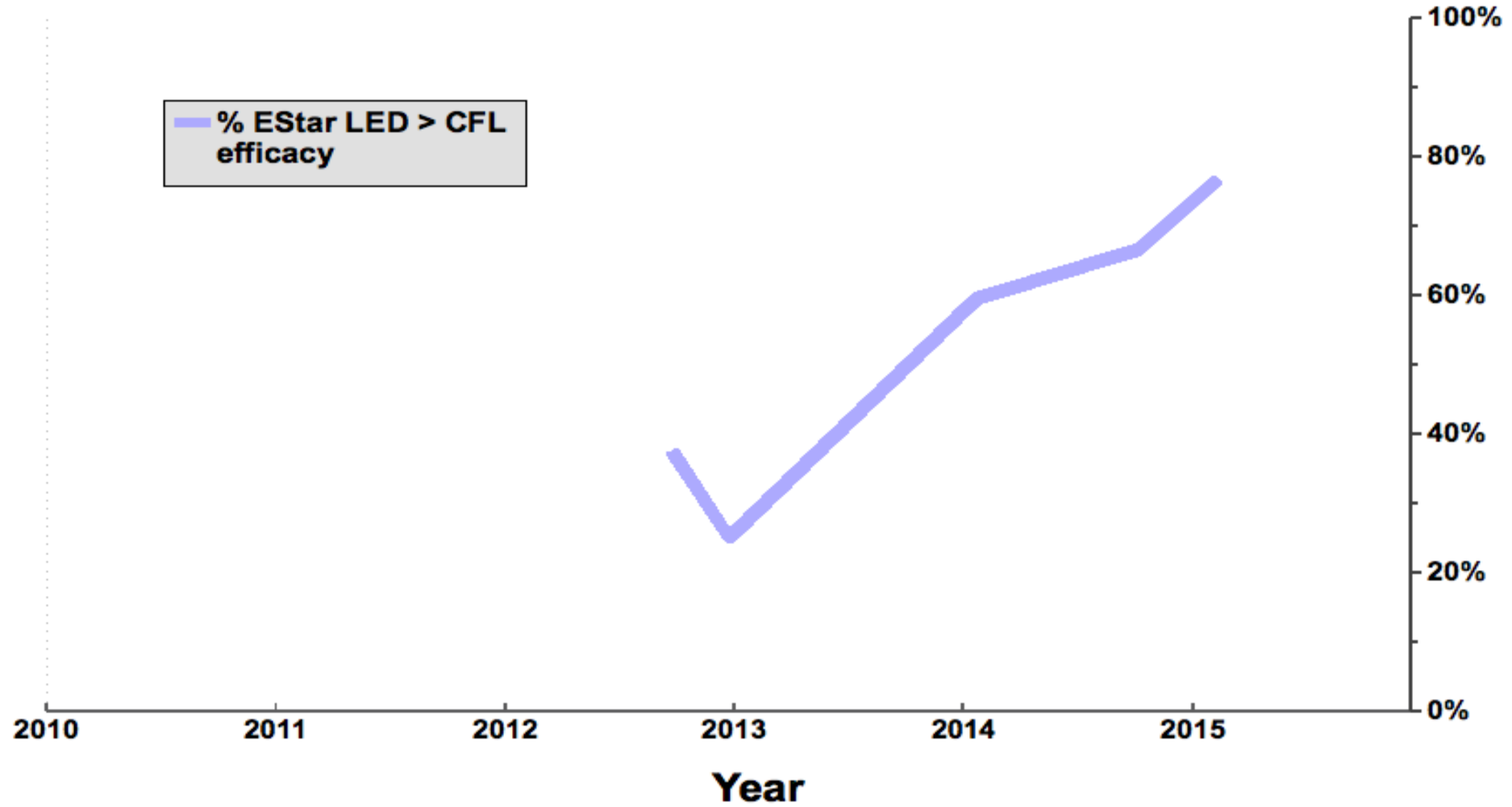
# History of Lamp Efficiency

## Best Source Efficacy in Lumens per Watt



# History of Lamp Efficiency

## Percentage of LED A-Lamps Beating CFL Efficacy



# History of Lamp Efficiency

## Percentage of LED A-Lamps Beating CFL Efficacy

