



What systems to use

CFL's and Cold Cathode's

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CFL

(Compact Fluorescent Lamp)

Vs.

CCFL

(Cold Cathode Fluorescent Lamp)



How to determine what CFL or
Cold Cathode is right

CFL's are typically 4 times brighter than their incandescent counterparts so a good rule of thumb is take your current wattage in incandescent and divide by 4

For instance
a 60w incandescent divided
by 4 would be a 15w CFL or
a 75w would be an 18w CFL

CFL's and Cold Cathodes

have wide range color options to choose from and this is represented by the lamps.

“Kelvin Temperature”

A CFL's Kelvin Temperature
will typically range from 2200k-6500k
the lower the Kelvin
Temperature the "warmer"
the color (yellow color)
the higher the Kelvin
Temperature the
"cooler" the color (blue/white)

Warmer colors should typically be used in residential and hospitality applications, like restaurants and hotels where as cooler colors should be used in exterior applications and doctors offices where higher visual acuity is needed.

CFL's and Dimming

CFL's and Dimming

**Are CFL's and Cold Cathode
Dimmable???**

Yes but not all.....



T8/T5

L8\L2



T8

T5

Mean Lumens

2950lm

4790lm

Length

48"

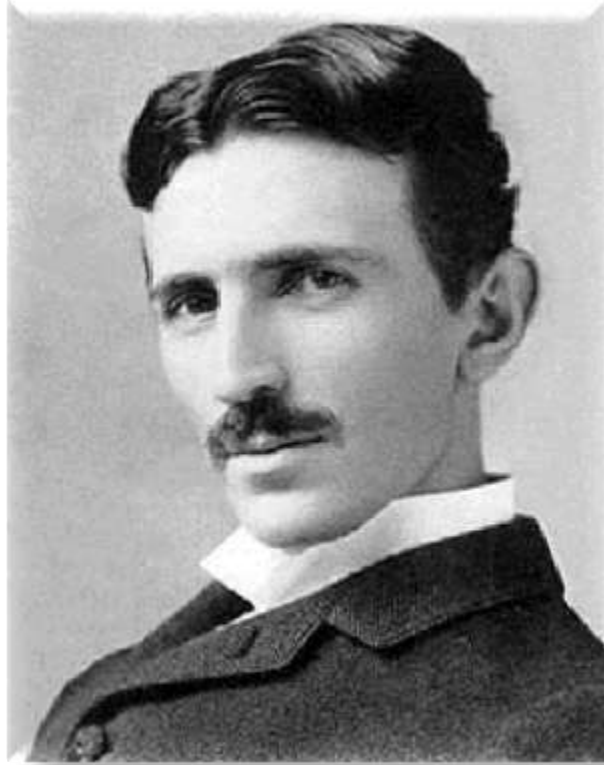
46"

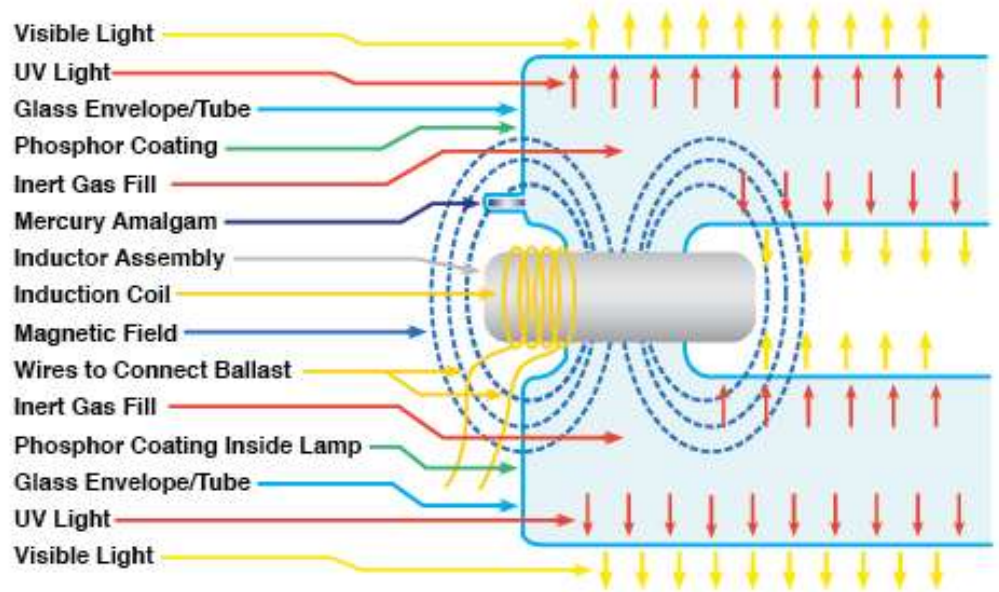




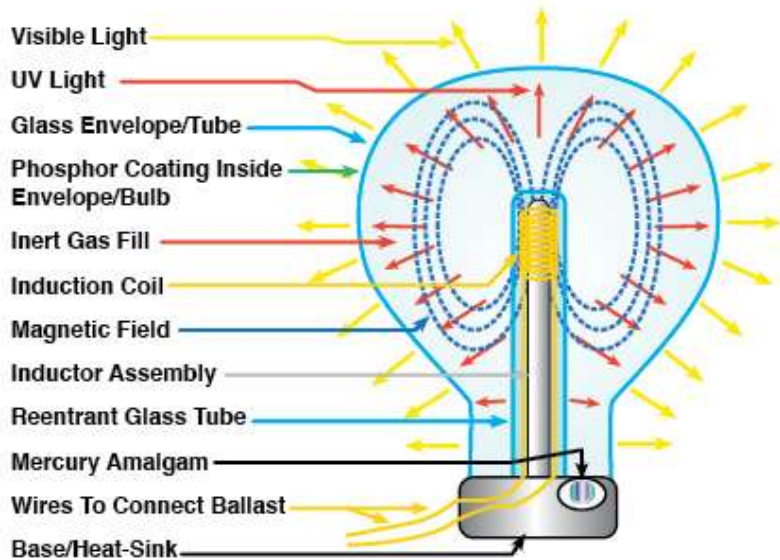
Induction

INDUCTION





External Inductor Lamp



Internal Inductor Lamp





(Images courtesy of Fulham)

L.E.D

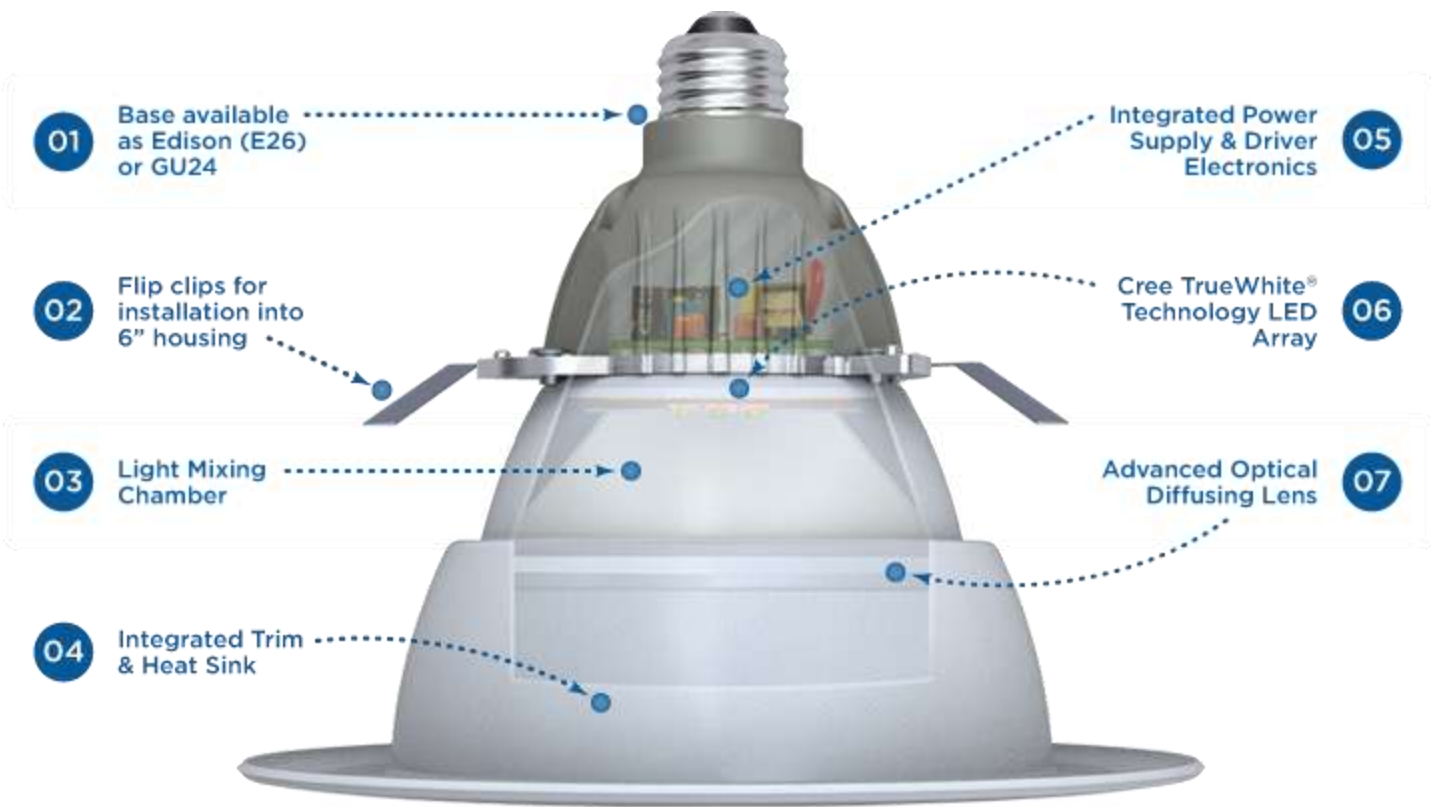
(Light Emitting Diode)



Heat = Shorter lamp life and
reduced output

Binning = Quality of the Diode

Optics = Control the Direction
of light



Inside The CR6

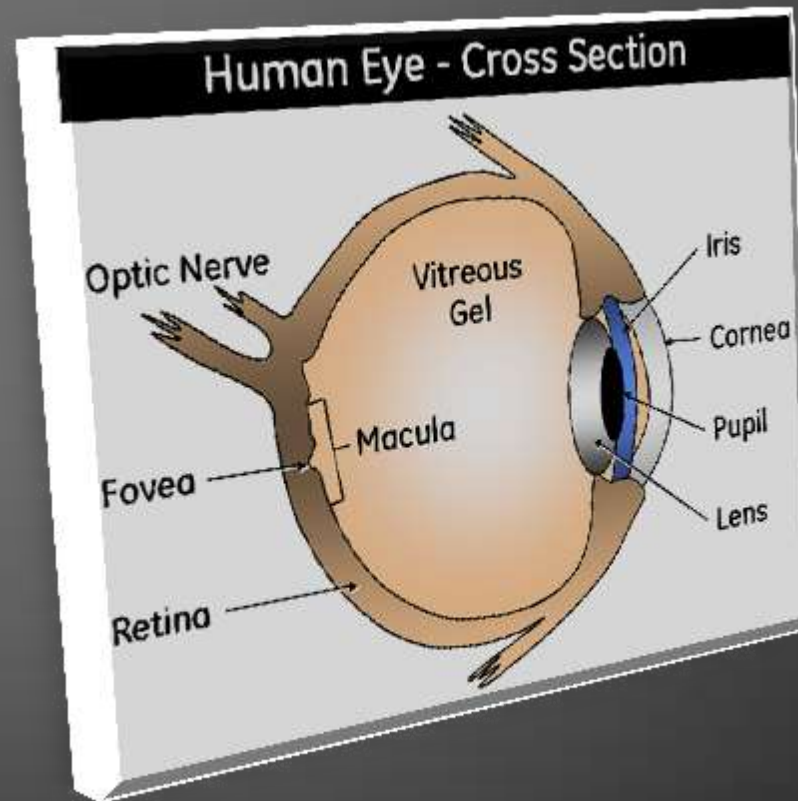
LED Standards Labeling

LM-79 and LM-80



Understanding Visibly Effective Lumens

“Visibly Effective Lumens” are based on not only the lumen out put but also the CRI (color rendering index) and the Kelvin temperature of the light source. This unit of measure is a way for us to quantify how much light is actually perceived by our eyes.



(Photopic and Scotopic – The “eyes” have it)

CRI

(The color rendering index)

is a quantitative measure of the ability of a light source to reproduce colors of objects accurately in comparison with a natural light source. (the sun)

Kelvin temperature

is a unit of measurement that describes the color appearance of light produced by a light source

lumen

Measures the power of light perceived by the human eye.

PHOTOPIC LUMENS

visual perception under normal conditions during the day

SCOTOPIC LUMENS

visual perception in low light (night vision).

MESOPIC LUMENS

Is the combination between Photopic and Scotopic vision

Table 2. Street light fixture information (Meridian Street)

	Initial HPS Street Lighting	Induction Demonstration Street Lighting
Lamp Type	HPS	Induction
Lamp Wattage ³	100 watts (110 watts with ballast)	55 watts including power for driver
CCT ³	2100 K	6500 K
Mean Lumens ³	8460	3300*
Lamp Life ³	30,000 hours non-cycling	60,000 hours
Fixture Type	Cobra Head	Cobra Head
Number of Fixtures	12	12
Light Distribution Type	Type II	Type II
Cutoff Classification	Cutoff	Cutoff
Lighting Control	Photo cell	Photo cell
Mounting Height	25 feet	25 feet
Avg. Illuminance (lux)	8.72 lux*	2.69 lux*

* From LRC test and measurement results

Figure 2. Initial HPS street lighting (Meridian Street)



Figure 3. Induction street lighting demonstration (Meridian Street)



(Peter Morante Mesopic Street Lighting Demonstration and Evaluation Final Report)

HPS 100w



Induction 55w



150W
HPS

Fig. A



85W
INDUCTION

Fig. B



(Fulham Catalog)

HPS 100w



Induction 55w



Table 2. Street light fixture information (Meridian Street)

	Initial HPS Street Lighting	Induction Demonstration Street Lighting
Lamp Type	HPS	Induction
Lamp Wattage⁹	100 watts (118 watts with ballast)	55 watts including power for driver
CCT⁹	2100 K	6500 K
Mean Lumens⁹	8460	3300*
Lamp Life⁹	30,000 hours non-cycling	60,000 hours
Fixture Type	Cobra Head	Cobra Head
Number of Fixtures	12	12
Light Distribution Type	Type II	Type II
Cutoff Classification	Cutoff	Cutoff
Lighting Control	Photo cell	Photo cell
Mounting Height	25 feet	25 feet
Avg. Illuminance (lux)	8.72 lux*	2.69 lux*

Below is a sample chart of typical S/P ratios of various light sources

SCOTOPIC/PHOTOPIC (S/P) RATIO

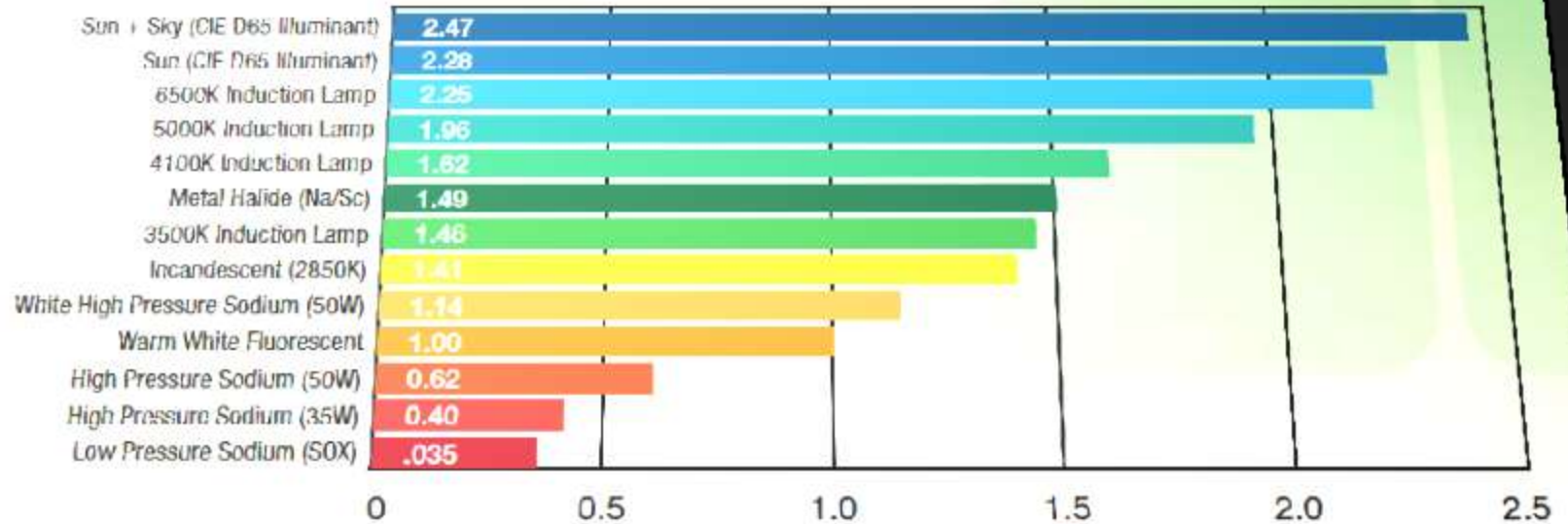


Chart calculations by Berkley Labs - actual selection of induction lamp wattage and type will vary with installation and user requirement.

and type will vary with installation and user requirement.
chart calculations by Berkley Labs - actual selection of induction lamp wattage

0 0.2 1.0 1.2 5.0 5.2

Low Pressure Sodium (20W)

.032

High Pressure Sodium (32W)

0.40

To calculate your VEL factor (Visibly Effective Lumens)

First take the lumen output of the lamp in question and multiply it by its S/P Ratio

LETS DO THE MATH

Comparison

**100w High Pressure Sodium
2100k**

Photopic Lumens 8,460

x

S/P .62

=

5,245
VEL

**55w Induction
6500k**

Photopic Lumens 3,300

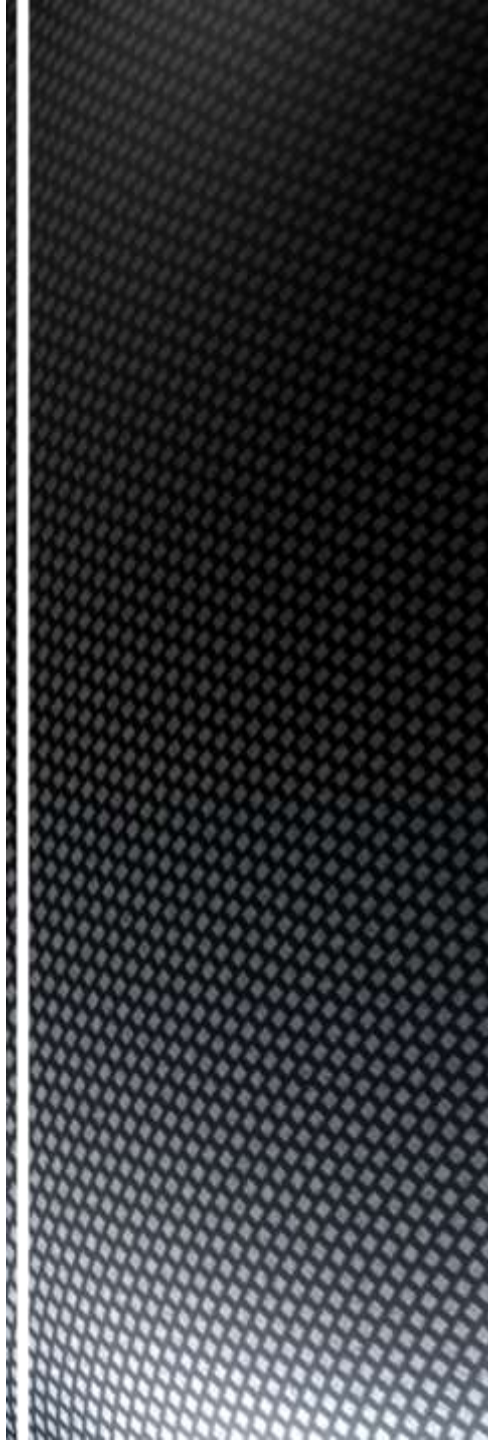
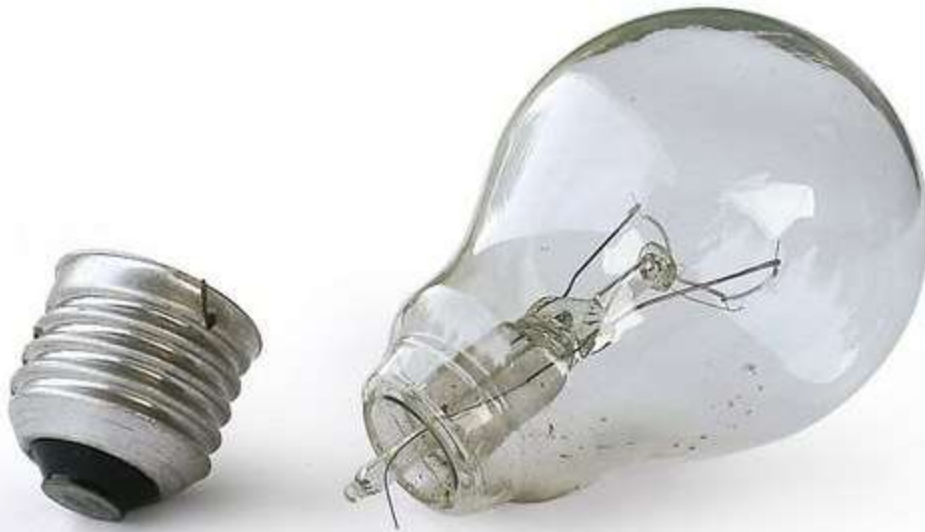
x

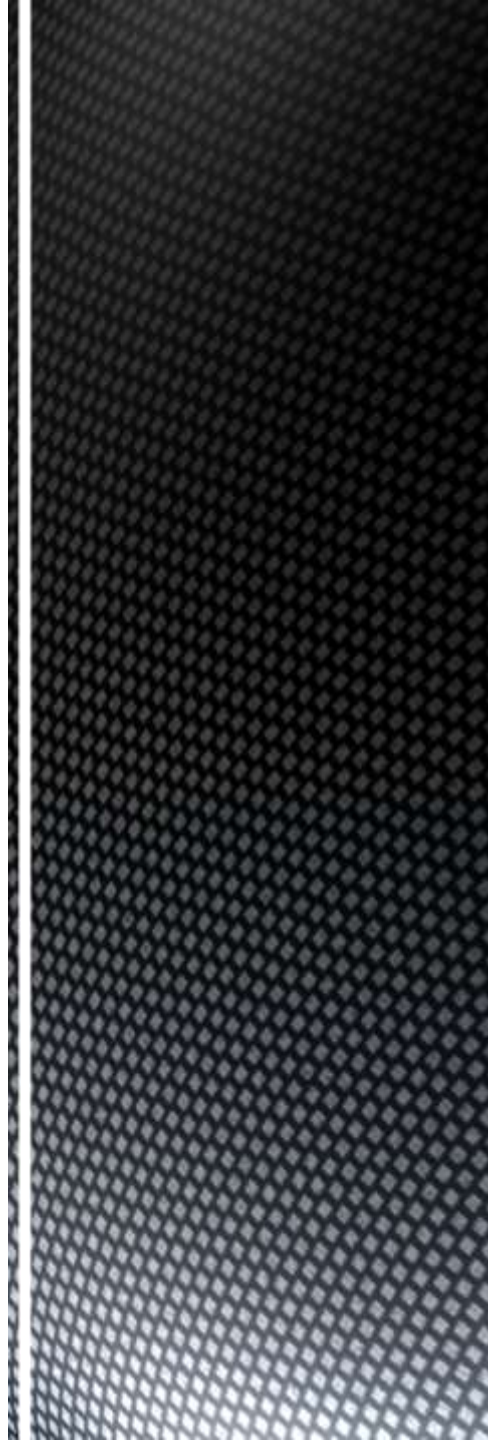
S/P 2.25

=

7,420
VEL

the difference of a traditional
incandescent
or halogen light source to a
CFL or LED, and why watts
don't translate the same
anymore.





Efficacy

is the ratio of Lumen to Watt

Energy Independence and Security Act of 2007

requiring all general-purpose light bulbs that produce 310–2600 lumens of light be 30% more energy efficient than current incandescent bulbs by 2012 to 2014. The efficiency standards will start with 100-watt bulbs in January 2012 and end with 40-watt bulbs in January 2014.

<http://www.gpo.gov/fdsys/pkg/PLAW-110publ140/html/PLAW-110publ140.htm>

India Venezuela European Union
Canada Ireland
Australia
United States Switzerland
United Kingdom Malaysia
New Zealand

Output (lm)

/

Power (W)

=

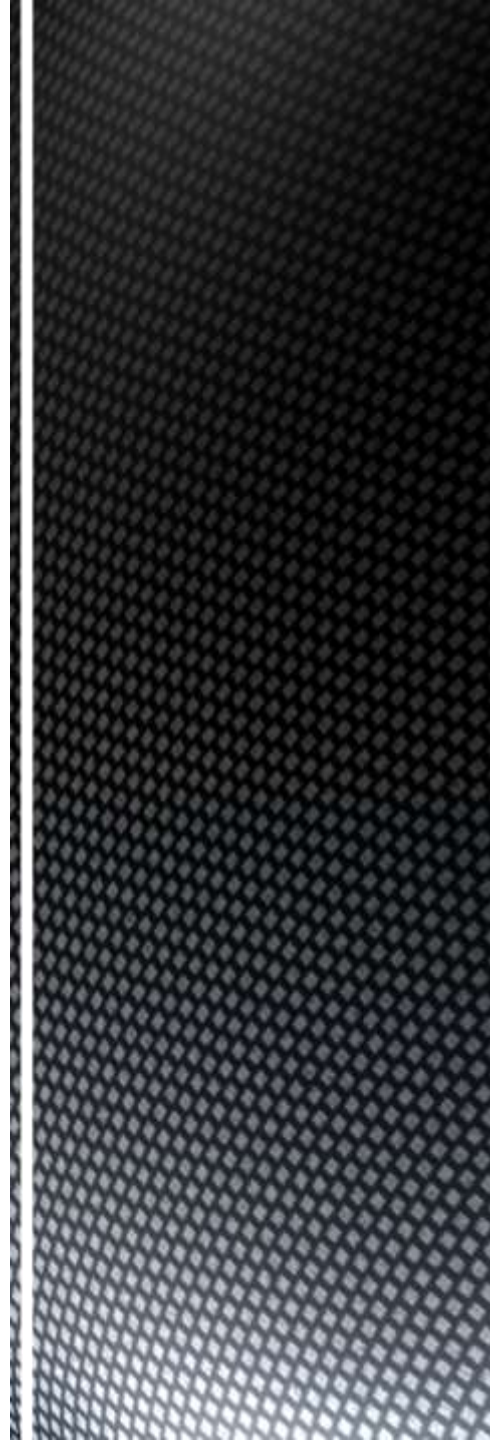
(lm/W)



$$100\text{w} / 1700\text{ lm} = 17.0\text{ lm/W}$$



23w / 1650 lm = 71.73 lm/W





$$12.5\text{w} / 1000 \text{ lm} = 80.0 \text{ lm/W}$$

