

**Incandescent** | E26 Medium & E12 Candelabra Base

This is the traditional "Edison" light bulb. It emits light in a warm, broad spectrum; however, approximately 90% of all the power consumed by an incandescent light bulb is emitted as heat rather than visible light. The original models are being phased out of use through government mandate, but more efficient bulbs are now available (about 28% less power consumption).

**Halogen** | T3 Bi-Pin, G4 Base & MR16, GU5.3 Base

Halogen is a form of incandescent. It has the truest color rendering of any light source other than the sun and is therefore often used to illuminate works of art. In the MR16 format, this long-lasting, low-voltage spot is amplified by an integrated reflector, greatly increasing its apparent efficacy.

**Ceramic Metal Halide** | E26 Medium Base

Metal Halide is an efficient, high-output lamp commonly used to illuminate large outdoor areas, in part because its output is unaffected by environmental temperature changes. Due to high intensity and slow start-up, it is best suited for outdoor and commercial applications. MHs contain mercury, requiring special disposal measures.

**Light-Emitting Diodes [LEDs]**

LEDs are a very promising technology currently undergoing rapid development. Their warmth and color rendering can be comparable to incandescent in certain applications. Their small size makes them highly versatile. Given their long life, high efficiency and low toxicity, their cost is often justified over time.



CFL [compact fluorescent] Integrated Ballast | GU-24 Pin & E26 Medium Base
CFLs use less energy than incandescents and can last up to eight times longer (if not overheated) while generating light that is becoming increasingly comparable. CFLs contain trace amounts of mercury, requiring special disposal measures. The ballast must be discarded along with this type of lamp.

**CFL non-integrated Twin & Quad Tube** | 2G11 & GX24Q, 2 & 4 Pin Base

These CFLs utilize separate, reusable electronic ballasts; they are slightly more efficient and can last longer compared to integrated-ballast CFLs. One ballast will often run multiple wattages and permit dimming. Lamp disposal issues are the same.

**High Pressure Sodium (HPS) & White "SON"**

These lamps are typically used for streetlights and security lighting, where color rendering is not critical. HPS lamps contain trace amounts of mercury, making disposability an issue, and they decline in lumen output as they age. White "SON" is a higher cost HPS variant with a high CRI but reduced life and efficacy.

**Fluorescent Tube** | T5, T5 HO Mini Bi-Pin, T8

The "new and improved" flicker-free fluorescent tube offers good color rendering, long life and low cost. Like all fluorescents, special disposal measures are required due to mercury content.

**LAMPING COMPARISON CHART**

	ENERGY OUTPUT watts	EFFICACY lumens per watt	CO2 lbs	CO2: lumen ratio	LAMP COST	LIFE (hours)	RUN COST per 1000 hrs	CRI 1-100	CCT kelvin
Incandescent	25	170	7	.194	60¢	1000	\$3.60	100	2700
	40	495	12	.105					
	60	830	14	.093					
BI-PIN	20	320	16	.081	\$3.30	2000 - 4000	\$3.40	100	2850
	20	320	16	.081	\$2	2000 - 4000	\$3.06	100	2950 - 6000
	35	600	17	.077	\$5		\$5.80		
MR-16	50	900	18	.072	\$10		\$9.26		
	22	1155	53	.023	\$88	12,000	\$9.94	81-96	2900 - 4100+
	70	4500	64	.020	\$32		\$11.06		
150	9800	65	.020	\$31	\$20.50				
LED	2	200	100*	.015	\$20	35,000 - 50,000	\$0.71	40-90	2900 - 6100
	5	500	100*	.014	\$38		\$1.49		
	10	1000	100*	.013	\$80		\$3.06		
CFL	13	850	65	.020	\$3	10,000	\$1.88	82-90	2700 - 4100
	18	1100	61	.020	\$4		\$2.60		
	23	1600	69	.018	\$4		\$3.16		
CFL	26	1800	69	.019	\$7	12,000 - 20,000	\$3.58	82-90	2700 - 6500
	32	2400	75	.018	\$10		\$4.47		
	36	2800	78	.016	\$11		\$4.98		
HPS	80	6000	75	.017	\$28		\$11.35		
	35	2250	64	.020	\$24	16,000	\$5.68	22	1900
	70	6400	91	.014		24,000	\$9.38		
SON	50	2000	40	.032	\$80	10,000	\$13.95	85	2500 - 2700
	100	4170	42	.031			\$19.95		
	28	2900	104	.015	\$10	25,000	\$3.68	82-85	3000 - 6500+
T5	35	3450	99	.014		35,000	\$4.52		
	17	1260	80	.017	\$5	20,000	\$2.18	78-96	3000 - 6500
T8	32	2800	80	.016	\$3	46,000	\$3.91		

1 Lumens are a measurement of the perceived power of light. All ratings approximate. 2 Efficacy = lumens/watts. The higher the number, the more efficient. 3 Approximate CO2 emission per 1,000 hours of use assuming coal generated electricity. 4 CO2 output per lumen is a finer gauge of sustainability. 5 Costs are collected averages. 6 Includes electricity at national average of 12¢/kwh, and average lamp cost. 7 CRI = Color Rendering Index. 100 = full color range: incandescent. 8 CCT = Correlated Color Temperature in degrees Kelvin. Low temps are "warm" colors, high: "cool". *Actual efficacies measured in application are generally between 40-60. This is rapidly improving.
For resources, references and more, go to <http://www.eleek.com/eleek-lamping-guide>

