



For calculating heat gain from lighting, the basic formula is always:

$$1 \text{ watt} = 3.4 \text{ BTU/hr}$$

The real secret is how to apply it.

### **INCADESCENT LIGHTS**

Take wattage of light bulb times 3.4 equals BTU/hr heat gain

Example:  $100 \text{ watt bulb} \times 3.4 = 340 \text{ BTU/hr}$

### **FLOURESCENT LIGHTS**

A. Fully in conditioned space  
Wattage of bulbs times 1.2 (for Ballast) times 3.4 equals BTU/hr heat gain

Example:  $4 - 40 \text{ watt bulbs}$   
 $4 \times 40 \times 1.2 \times 3.4 = 653 \text{ BTU/hr heat gain}$

B. In Drop in Ceiling (Not Conditioned Space)  
Wattage of bulbs times 1.2 times 0.6 times 3.4 equals BTU/hr heat gain

Example:  $4 - 40 \text{ watt bulbs}$   
 $4 \times 40 \times 1.2 \times 0.6 \times 3.4 = 392 \text{ BTU/hr heat gain}$

### **LED LIGHTS**

You should have some data on the conversion in your literature but lacking everything else, I would use the same formula as incadescent lights. For instance, if you have an LED substitute for a 100 watt bulb that is rated at 12 watts, I would use:

$$12 \times 3.4 = 41 \text{ BTU/hr heat gain}$$

### **HVAC ENERGY SAVINGS**

Converting that to energy saving for HVAC is simply looking at the difference and then converting BTU of cooling to energy input required for HVAC. For instance, let's use a 1000 sq ft room with 3.0 watts per square foot using incadescent bulbs. You are proposing substituting LEDS which have an energy use of 450 watts total (0.45 watts per square foot).

Present Heat Gain Lighting:  $1000 \times 3 \times 3.4 = 10,200 \text{ BTU/hr}$

# LEOPTICS - Calculated Heat Gain For Lighting

LED Heat Gain:  $450 \times 3.4 = 1,530$  BTU/hr

Savings:  $8,670$  BTU/hr

Now we need to convert that to electric savings for the HVAC System.

Step 1: Divide savings by 2.25 - this BTU/hr electric energy input reduction

Step 2: Divide that figure by 3.4 to get watts of electricity saved

In example,  $8,670 \text{ BTU/hr} / 2.25 = 3,853 \text{ BTU/hr}$  of reduced electricity divided by 3.4 equals 1,133 watts of electric energy savings or 1.13 kilowatts.

To get some idea of cost savings, estimate hours per day lights are on. Then multiple savings in kilowatts times hours per day to kilowatt-hours per day savings.

In example, if lights are on 10 hours per day, then savings is:

$1.13 \text{ kilowatt savings} \times 10 \text{ hours/day} = 11.3 \text{ kilowatt-hours per day savings}$

Dollar savings are just cost per kilowatt-hour times kilowatt-hours per day savings. For instance, up here, Gulf Power is charging (on average) \$0.13 per kilowatt-hour. For example, daily savings is:

$11.3 \text{ kilowatt-hours per day} \times \$0.13/\text{kilowatt-hour} = \$1.47 \text{ per day savings}$



Phone: **877.LED.BULB**  
877.533.2852  
Cell: 561.305.1980  
Fax: 888.334.6110  
[www.ledoptics.com](http://www.ledoptics.com)  
[adam@ledoptics.com](mailto:adam@ledoptics.com)

544 NW 77th Street  
Boca Raton, FL 33487