

## School Energy Investigations - Lighting

Complete the worksheet below for each room in the building you wish to audit.

You will need: Light Meter

### Introduction

Lighting is one of the largest users of electricity, accounting for 25% or more of a school building's electrical use and 10% or more of home electrical use. It is also the system that occupants have the most control over day-to-day. Investing in new lighting technologies, installing motion or photo sensors and turning lights off when they aren't needed can have a major impact on decreasing overall building electricity use and costs.

### Part 1 – General Lighting Room Audit

Begin to survey each of the rooms in the building you choose to audit by filling out the table below. Indicate what room you are auditing and the room number (if applicable).

A. What room are you auditing? \_\_\_\_\_ Room number \_\_\_\_\_

B. Describe the weather today (partly cloudy, sunny, rainy, etc.). \_\_\_\_\_

General Lighting Audit Questions		
C. What type of overhead lighting is used in the room (incandescent, fluorescent, LED)?		
	YES	NO
D. Are the overhead lights turned on/off automatically by motion or photo sensors?		
E. If no, are overhead lights always manually turned off when no one is in the room? (Did you notice if the lights were on when you first entered the room?)		
F. Can the overhead lights be turned on/off separately by row, fixture or bulb?		
G. Does the room receive natural light through windows or skylights?		
H. Are there other lighting appliances in the room other than the overhead lights (desk lamps, floor lamps, string lights, etc.)? If yes, list the type of appliance below.		

I. Additional lighting appliances in room:

\_\_\_\_\_

J. Of the lighting appliances you listed in question I above, which do NOT have LED bulbs.

\_\_\_\_\_

### Part 2 – Lighting Measurement

Use a light meter to measure and record the amount of light in Lux in the following locations around the room.

Lighting Measurement	
Room Location	Light Level in Lux
A. Front of room	
B. Center of room	
C. Back of room	
D. Room average (A+B+C)/3 =	

- E. Look at the values for lighting in the Standard Lighting Levels for School Buildings table below. What is the recommended lighting level in Lux for the type of room you audited?

Standard Lighting Levels for School Buildings		
School space	Foot-Candles	Lux
Cafeteria	20-30	200-300
Classroom	30-50	300-500
Classroom (Lab)	50-75	500-750
Hallway	5-10	50-100
Gym	30-50	300-500
Kitchen	30-75	300-750
Library (work area)	30-50	300-500
Library (stacks)	20-50	200-500
Lobby	20-30	200-300
Locker room	10-30	100-300
Lounge/Breakroom	10-30	100-300
Office (private)	10-30	100-300
Office (public)	20-30	200-300
Restroom	10-30	100-300
Stairway	5-10	50-100
Storage room	5-20	50-200
Workshop	30-75	300-750

- F. Compare the recommended lighting level in Lux to the room average you calculated in line D of the Lighting Measurement chart from page 1. Is the room under lit, within range or over lit?

- G. If the room is over lit, what solutions could bring the lighting level within the recommended standard lighting levels for school buildings?

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For additional insight on how to use a light meter and possible energy saving solutions for lighting rooms see KEEP's [School Energy Audit Best Practices](#) guide.

### Extension – Light and Your Load

The type of light bulb (lamp) used to illuminate school buildings plays a big part in a school’s electricity bill. Switching to LED (Light Emitting Diode) lighting produces light approximately 90% more efficiently than incandescent light bulbs and approximately 50% more efficiently than fluorescent light bulbs. LED lights are also predicted to last 2-5 times longer than fluorescent lighting. No matter what kind of light bulbs are illuminating your school building, less electricity is consumed if lights are turned off when not needed.

Use the same room that you audited for parts 1 and 2 along with the Approximate Watts used for Light Fixtures table to complete the Light Count table questions A-E.

Approximate Watts used for Light Fixtures			
Type of fixture	T8 32W 4’ fluorescent	T5 28 W 4’ fluorescent	T8 12W 4’ LED
1 bulb (lamp)	32 Watts	32 Watts	12 Watts
2 bulb (lamp)	59 Watts	63 Watts	24 Watts
3 bulb (lamp)	88 Watts	95 Watts	36 Watts
4 bulb (lamp)	117 Watts	126 Watts	48 Watts

\*If you cannot determine the approximate number of watts for your classroom fixtures using the table above, use 126 watts per fixture.

### Light Count

Light Count				
A. Number of overhead light fixtures	B. Number of bulbs (lamps) per overhead fixture	C. Type of bulb (incandescent, fluorescent, LED)	D. Watts per fixture (see table above)	E. Average number of hours on per day (estimated in one-hour increments)

Use the information in the Light Count table to calculate the cost of lighting the room for one year.

Cost of Room Lighting for One Year Calculations	
Use information from the Light Count data table.	
F. Watt-hours per day (A X D X E) =	Watt-hours/day
G. Watt-hours used per month (F X 22 days) =	Watt-hours/month
H. Total kilowatt-hours per month (G ÷ 1000 watts) =	kWh/month
I. Cost of lighting room for one month (H X \$0.13/kWh) =	
J. Cost of lighting room for one school year (I X 10 months) =	

K. Look at the total cost of lighting for the year for the room you just calculated in J. This is just the cost of one room. Without upgrading the lighting, how could you decrease your lighting costs? Describe specific strategies that you could implement.

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L. Are there strategies you could suggest school-wide that could decrease electricity use from lighting in your entire building? Remember the cost you calculated in J was just for one room!

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