

Environmental Audit - Energy Team

The energy audit aims to determine the level of energy used within various sections of the school. This information is valuable in targeting possible areas within the school where energy conservation strategies will have the greatest impact. (An historical audit of school energy bills/meter readings are separate pre-audit activities.)

Introduction to the audit - Why is auditing energy important?

It will help your school:

- * **reduce greenhouse gas emissions**
- * **help the environment by conserving the use of non-renewable energy resources.**
- * **save money**-savings made from energy conservation strategies can be used in funding environmental improvement programs.
- * **raise environmental awareness about sustainable lifestyles.**

A. Electricity Investigation: School Audit

Using a base map, students will work in teams of two in order to survey every building in the school. Students assess the number of items such as fans, lights, and refrigerators etc. that exist within the school and then they approximate the number of hours they are used per day. Using a computer, this information is then entered into an energy calculator, to calculate the yearly electricity consumption. The actual costs obtained from energy bills should be approximately the same as the estimated costs. While surveying the buildings, students will also measure the light levels using a light meter to determine necessary light requirements. Comparing observed results with recommended standard light levels for school buildings may provide a further strategy for reducing electricity costs

Student Instructions

1. **Discuss** the meaning of the Greenhouse Effect using a model of the earth. Learn about renewable and non-renewable energy using Greenhouse posters.
2. **View** a graph of the historical audit of school electricity bill (**Results Table 1**) Discuss which month has the highest electricity consumption and suggest possible reasons.
3. **Look** at your map. Go to your survey area. Take clipboard/pencil, data collection sheet and light meter.
4. **Count** all items that use electricity and record the results on the data collection sheet.
5. **Measure** light levels in each room and corridor.
6. **Meet** back in the computer room. Using a table **estimate** the wattage of each item surveyed.
7. **Data entry:** Using the Energy Calculator, enter the items and the wattage per item (found on the Integral energy chart). The estimate of how many hours per day the item is used is already printed on your sheet.
8. **Calculate** the total kWh per building by scrolling to the bottom of the table on the Energy Calculator. **Read** total kWh from the last column. **Record in Results Table 3.** Compare with historical data.
9. **Record** your light meter readings in **Results Table 4.** Compare results with recommended levels.
10. **Discuss** possible recommendations to reduce greenhouse gas emissions.
11. **Prepare** a report giving a summary of your findings.

B. Light Investigation

In many schools, lights are left on when there is excellent natural lighting provided. The purpose of this audit, is to determine present levels of natural lighting with lights switched off, in order to see if it is adequate for specific uses. A table of recommended levels is included for comparisons.

Student Instructions

1. Measure light levels in your allocated building using a light meter.
2. Record your measurement in Results Table 4.

RESULTS SHEET - ENERGY AUDIT

Results Table 1: Historical Audit - Electricity

Period	kWh	\$
1 st Quarter		
2 nd Quarter		
3 rd Quarter		
4 th Quarter		

- *Total Annual Electricity Usage _____ kWh
- *Estimation of Annual School Greenhouse Gas Emissions (Electricity) _____ kg/CO₂
- *Estimate the whole school energy usage by adding gas, LPG statistics to this figure.
(1-kilowatt hour (kWh) of electricity produces 1kg Greenhouse Gas)
(1 mega joule (Mj) of Natural Gas produces 0.06kg Greenhouse Gas)
(1 Litre of LPG produces 1.kg Greenhouse Gas)
- *Total School Greenhouse Gas Emissions _____ kg/CO₂

Results Table 2: School Meter Readings

- *Daily Electricity Usage _____ kWh (9-3pm)
- * Overnight Electricity Usage _____ kWh (3pm-9am)
- *Daily Gas Usage _____ M J
- *Overnight Gas Usage _____ M J
- *Total Daily Greenhouse Gas emissions _____ kg/CO₂

Results Table 3: Walk Through Assessment

A Block -----kWh	B Block -----kWh	C Block -----kWh	D Block -----kWh	E Block -----kWh
F Block -----kWh	G Block -----kWh	H Block -----kWh	I Block -----kWh	J Block -----kWh
-----kWh	-----kWh	-----kWh	-----kWh	-----kWh

*Total Annual Electricity Usage Estimate for whole school _____ kWh

Results table 4: Light Meter Readings

Weather Conditions _____ Outdoor light level _____ lux

Total number of readings taken	Total number of readings well above standard (>50 lux)	Total number of readings taken below standard (<50 Lux)	Total number taken at standard Within 20 Lux either side

Comments

Data Collection Sheet / Energy Audit**TEAM:** _____

Area of the school being surveyed (Block): _____

Names of students: _____

Date: _____

Item	How many items in your block ?	Estimated hours used		Days per year
		per day	per week	
Inside lights (include corridors) Fluorescent		6	40	200
Incandescent		6	40	200
Outside lights (include corridors) Fluorescent		15	52	365
Floodlight		15	52	365
fans		5	2	60
air conditioners		6	20	100
heaters		3	20	200
computers		1	40	65
printers		8	40	200
photocopiers		8	40	200
refrigerators		24	52	365
freezers		24	52	365
hot water units		24	52	365
TV		1.5	10	50
video		1.5	10	50
microwave oven		.5	40	200
stove		1	45	220
overhead projector		1	25	125
radios		.5	10	50
jug/kettle		2	40	50
pottery kiln		5	10	50
other				

School Light Survey



School: **Date of Survey:**

Weather Conditions: **Outdoor Light Level:**LUX

Area	Light Level (LUX)	Suggested Light Level* (LUX) **	Increase or decrease	Comments
Entrance Area, waiting room		160		
Corridor, passageways		40		
Classroom 1. general use		240		
Classroom 2. general use		240		
Classroom 3. general use		240		
Classroom 4. general use		240		
Classroom: TAS sewing/drawing		400		
Assembly Hall: general use		80		
Assembly Hall: exams		240		
Library		240-400		
General Office		400		
Storeroom		80-160		
Toilet		80		
Other:				
Other:				

* According to Australian Standard AS 1680

** LUX is a light illuminance

Findings:

Total number of readings taken _____

Total number of readings well above standard _____ (50 Lux over standard)

Total number of readings taken below standard _____ (50 Lux below standard)

Total number taken at standard _____ (Within 20 Lux either side)

Summary of Findings and Recommendations

A. Electricity Investigation

* Compare our results with the historical data. Discuss.

* Which block uses the most electricity?

* Why? _____

* Suggest ways to reduce electricity consumption in different areas of the school.

* Identify any areas of the school that are **already** demonstrating energy efficient strategies? (E.g. energy efficient appliances, timers, skylights, low power energy saving modes etc)

B. Light Investigation

Comment on lighting around the school. Discuss natural lighting and observed behaviour (i.e. students and teachers switching off lights after leaving rooms)

* Could lighting be reduced in any areas?

* Are there any areas, which are too dark?

* Other comments

Report Plan for Assembly

Use this space to plan your short speech or act to report back to the other students about the results of our Energy Audit. Be creative!! Songs, dances, acts, art!!!