GUARDIAN OF THE LIGHT

Goal(s):

- To understand the connection between their use of electric lighting in the classroom and energy consumption.
- Know how to limit the energy consumption through simple actions.
- To get the habit of switching off the light when not needed.

General description of the activity:

Lighting is one of the most visible uses of electricity in the pupil's everyday lives. It is also something over which they have significant control. Energy efficient behaviour can easily be instilled so that it becomes a natural habit.

In this exercise the pupils record the use of electric lighting in their classroom together with the weather conditions for a week. The following week they try to reduce the unnecessary use of lighting and the achieved savings are calculated.

The use of lighting is recorded by measuring the amount of time that the light is on and the energy consumption of the lighting per time unit.

The amount of time that the light is on is recorded using a stop watch.

The energy consumption can be found by determining the wattage of the light bulbs and their number. Multiplying the two figures will give the energy consumption per time unit. If it impossible to see the wattage of the light bulbs without touching the lamps then the school caretaker can be asked for assistance.

The daily recording task can be done by two pupils:

- Pupil 1 the "Time keeper" records the amount of time that the light is on 2)
- Pupil 2 the "Weather person" records the outdoor weather in each lesson (dark weather, grey weather, clear weather).

How one determines what 'type' of weather it is should be discussed with the pupils before the start of the recordings.

Required materials:

- A stopwatch
- Recording tables

Required pupil skills:

Counting, multiplication, filling in tables/graphs, telling time, interpreting data, appropriate weather vocabulary, speaking and listening.

How does this activity fit into the curriculum:

Mathematics, Geography, Science, Citizenship, Literacy.

Guidance 'Aids':

These Aids are referenced in the instructions below and are designed to help you plan and implement the lessons.

Aid 1 – Background information on electric lighting and saving possibilities.

Aid 2 – Rota of Time keepers, Weather persons, and Guardians of the light.

Aid 3 – Data collection sheets.

Aid 4 – Sheet for calculation of electricity savings.

Safety issues:

No safety issues

Individual steps of the activity:	Required time:
1. If relevant, present the exercise to the school caretaker and get his/her agreement to provide the necessary assistance.	Preparation – A meeting with the school caretaker.
2. Explain the exercise to the pupils and identify the "Time keepers" and "Weather persons" for all days of the two weeks. 3. Have the pupils carry out the measurements for one week.	Introduction and observation – ½ lesson **(see Aids 1, 2 & 3)**
4. At the end of the first week or the beginning of the second week, discuss the measurements recorded so far and the possibilities for reducing the waste of electric light. Ask questions such as: ➢ When is lighting needed (mornings versus afternoons, bright versus cloudy days, summer versus winter)? ➢ What are the alternatives to electric lighting? ➢ What level of light is needed for the work in the classroom? See "Suggestions for combinations with other AL activities" further ahead if you wish to organise an AL activity that addresses this question. 5. Appoint a "Guardian of the light" for each day of the second week. They will be responsible for switching off the	Reflection – ½ lesson

light when the pupils leave the classroom.

6. At the end of the second week calculate the difference between the results of the two weeks and discuss the reasons for the difference.
   - How much energy can be saved in just one week?
   - How much is that in a year (37 weeks/year)?
   - If all classes saved the same amount, how much would that be for the entire school?
   - How many bicycles could be bought for the money saved? The cost of one kWh can be obtained from the caretaker, the accounting department, the local electricity supplier, or the local energy agency (see Aid 1 for useful links).
   - What can the pupils do at home? See "Suggestions for combinations with other AL activities" further ahead if you wish to organise an AL activity that addresses this question.

Experiment and analysis – 1 lesson **(see Aid 4)**

Varies according to country e.g. UK is 39 weeks.

Varies according to country.

Suggestions for combination with other AL activities:

"Shine a light on savings" – What are the differences between the various types of bulbs that you find in the shops?

"One day without electricity" – What did they do before electricity was discovered?

"Switch me off" – Younger pupils design signs to be mounted next to light switches.

Variations:

Increased impact:

You can reinforce the habit of switching the light off when not needed by continuing to appoint a weekly "Guardian of the light" even after completion of the exercise. The role as "Guardian of the light" could be combined with other jobs that the pupils are expected to do in school.

Increased complexity of the activity to suit older pupils:

More complex and accurate calculations can be made using a more science based approach where the consumption of different types of lamps and light bulb sizes are compared using electricity meters borrowed from the local energy agency or electricity provider. Questions to explore the issues might be:

- Could more efficient lamps and bulbs benefit the school?
- How about automatic sensors that turn off the light when not needed or when nobody is in the room?

Increased dissemination:

Have the class prepare a presentation or exhibit for the parents or the entire school (*see Active Citizenship suggestion below*)

Increased involvement:

Get the entire school to perform the exercise. The common areas such as corridors, the assembly hall, toilets, bathrooms, the staff room, the head teacher's office, etc. could be monitored. Remember to give the teachers and other staff areas of responsibility – not just the children! Could there be a 'common reward' for energy efficient behaviour? This could take the form of a certificate or more tangible reward bought some of the money saved. You should ask:

- Who gets credit for achieved electricity savings?
- Can energy budget saving be used for other purposes such as teaching materials, excursions, special events?
- What consequences does it have on consumption levels that some schools may not benefit themselves financially from achieved energy savings?
- Is the lighting of a sufficient quality?
- Are broken lamps and burnt out bulbs a problem?

Active Citizenship:

As with other 'Active Learning' assignments, the data can be used to influence the local decision makers at school and authority levels. This is an important aspect of Citizenship. It shows the pupils that they can make a difference.

Background information on electric lighting and saving possibilities

Local energy agency website – [Insert web address]

National energy agency website – [Insert web address]

www.eu-greenlight.org – A European site for an on-going voluntary programme whereby private and public organisations commit towards the European Commission to reducing their lighting energy use

[Other European sites]

[The exact contents of Aid 1 will be determined by each AL project partner.]

Rota of Time keepers, Weather persons, and Guardians of the light

WEEK 1	Time keeper	Weather person
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		

WEEK 2	Time keeper	Weather person	Guardian of the light
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			

Name of Time keeper:	

WEEK 1	Time of lesson	Subject	Light on (minutes)
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			

Total minutes		Total minutes	

Name of Weather person:	

WEEK 1	Time of lesson	Subject	Dark	Grey	Clear
Monday					
Tuesday					
Wednesday					
Thursday					
Friday					

If we were able to save the same amount of electricity each week, how many bicycles could one buy for the amount of money saved?

Week 1	Total minutes with light on:	minutes
	Total hours with light on (60 minutes/hour):	hours

Week 2	Total minutes with light on:	minutes
	Total hours with light on (60 minutes/hour):	hours

Hours week 1 – hours week 2	**hours/week**

"Watt" indicates the level of electricity consumption of a bulb.

It is marked on the bulb and followed by a "W" for "Watt".

The total installed wattage in the classroom = number of bulbs * Watt.

Total installed wattage in the class room:	W
Electricity saved in week 2:	Wh/week

Usually, when talking about electricity the term "kWh" is used (kilo Watt hours). "kilo" is just another way of saying "1,000". The kWh is found by multiplying the number of hours that the light is on with 1,000 times the Watt indicated on the bulbs (1,000 * hours * W).

Electricity saved in week 2:	kWh/week
With 37 school weeks per year this gives:	kWh/year
The price of 1 kWh electricity is:	EUR/kWh
This means that in a year we could possibly save:	EUR/year
If a bicycle costs 300 EUR, the saved money could buy:	**bicycles**

Search words:

Energy end-use	General topic	Educational subject	Age level
Transport	General sustainable development	**Mathematics**	6-8 years
Space heating & cooling	Renewable energy	**Science**	**9-10 years**
Hot & cold water	**Energy efficiency (saving)**	**Literacy**	11-12 years
Lighting	CO_2 wise transport	**Citizenship**	
Electric appliances			