Energy Theme:
Learn about Lighting
Actions and Lighting Audit

Suitable for Post Primary

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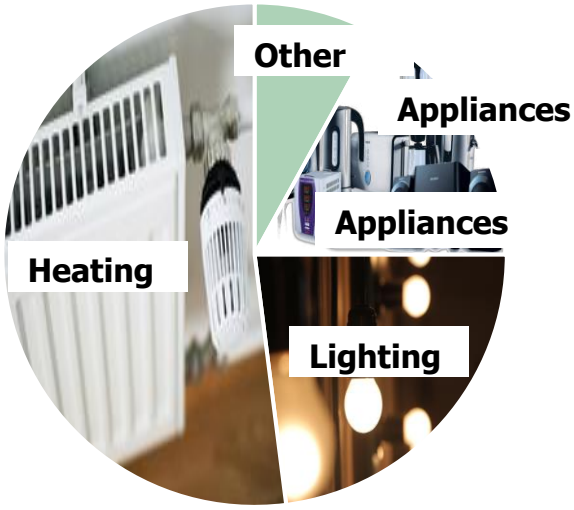
Lighting is one of the areas that links well with Green Schools energy actions, Electricity is expensive and has a relatively high global warming potential. Lighting a school can be responsible for up to 30% - 40% of energy costs. Before your school takes any actions related to lighting, you should review the lighting situation in the school.

How can your school review its lighting: This can be done, simply by counting the lights in the school, both indoors and outdoors. You can investigate the type of bulbs, look at the wattage, estimate how long they are left on each day, and even carry out a natural light surveys.

Schools Energy Use



Based on the lighting review to can some of the following actions or come up with your own. Start with **No Cost to Low Cost,** actions:

- Maximize use of natural light – why not look at how the classroom is set up to make the best use of the light from your windows. (set up a test classroom).
- Where practical, use daylight. Switch off lights when daylight is enough, in particular if you can turn off lights strips nearest the window. Better yet take advantage of good weather and learn outdoors.(remembering to switch off before you leave the room.)
- Actively use window blinds to promote daylight and control glare. Only close blinds when there is a problem with glare e.g. from direct sunlight.
- Switch off lights when the room is empty.
- Some secondary school physics labs have light meters which you could use to measure light. Alternately there are free use light meter apps for mobile phones. Light levels are measured in units of lux. About 300 lux is recommended at student desks, and G.P. halls. P.E. halls should have 400 lux. 120 lux is recommended for corridors and toilets.

Energy Theme:
Learn about Lighting

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- In many classrooms there are separate switches of lights, that separate different areas in the classroom. If these can be used to turn off lights in areas that natural daylight is abundant, this can reduce energy use. Labelling the light switches makes it far easier switch off the correct areas, and this could be part of your switch off campaign.
- Energy savings of 50% -80% can be made by switching to LED bulbs which should last up to 20 times longer. Replace incandescent bulbs with LED bulbs. As CFL bulbs fail, replace those with LED bulbs.
- In rooms with older fluorescent light fittings, if there is too much light in an area with multi-lamp fittings, it is often possible to reduce energy usage by removing one lamp (i.e. one tube).
- Over-lit areas are generally found in schools where lighting has already been replaced, but without advice from a design engineer
- Read the electricity meter regularly and send the reading to the electricity supplier once per month.
- Rather than buying fluorescent tubes for existing fluorescent fittings, consider replacing fittings with new energy efficient LED fittings room by room and keeping the old fittings as spares.
- New LED fittings can last for up to 50,000 hours and with less maintenance needed.
- Exterior lights left on during the day, or all night, waste energy.
- If these are set to timers used to switch lights, make sure they are adjusted seasonally and with changes of hours. when the clocks change. Ask your caretaker to ensure this , this can safe as much as 22% on lighting bills.
- Solar powered external lights that work off motion detectors are also a good option, but this has an initial cost before savings in the long run.
- Check Dark Skies Ireland – to learn more about outside lighting and how it effects nature and light pollution. They have produced a nice Toolkits and Guidelines document to help with your choices. (www.darksky.ie)

On the following sheet we have a general lighting room review: use this to survey each of the rooms in your school filling out the table below.

Energy Theme:
Lighting Survey/

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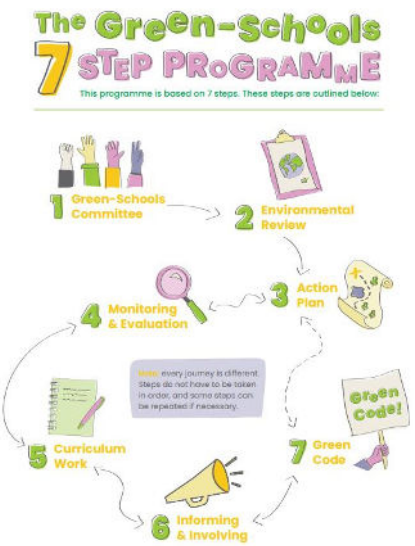
Aim: To discover how more about lighting in your school, what type of lights , how they operate and are lights being left turned when not in use.

Lighting a school can be responsible for up to 30% - 40% of energy costs. Before your school takes any actions related to lighting, you should review the lighting situation in the school. There are easy actions to reduce the cost such as switch off campaigns.



Lighting surveys are a great way of discovering how much of the school's lights are outdated, on sensors or even left on when no one needs them, therefore increasing your energy consumption. Making it a part of step 2 environmental review.

The results of the lighting surveys will allow you to identify where you can save energy in the school by turning off lights when not needed or even upgrading old fittings. Making it a part of step 3 your action plan.

This action also links with your Curriculum work step 5 – with the use of Maths, Art, Stem , Geography, and IT to create graphs and diagrams that show the results of the audit.

Use the activity sheet attached to search the school for all lighting present. Don't forget the rooms that students don't normally have access to like the staff room, but students you need to ask permission 1st.

Some of the newer lighting systems will have energy saving senors and more efficient bulbs – these can also last significantly longer. To take it a step future why not learn about wattages and light bulb rating online. In Ireland, light bulb selection involves understanding wattage (energy consumption), lumens (brightness), and the EU energy label (efficiency).
Learn more about the EU energy label , with the SEAI www.seai.ie/blog/label-help-shopping.

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School Area (rooms, hallways, pe halls, outside spaces....)	Number of Lights	Types of Bulb	Wattage	Lux Reading

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Light can be responsible for up to 40% of energy costs in a school. We can reduce light costs by changing bulbs to more energy efficient lighting like LEDs. Or have switch off campaigns.

Light is measured in Lumens – it is the amount of light (lumens) falling on a surface (over any given square meter). Therefore, light intensity is measured in terms of lumens per square meter (lux).

You can use a LUX meter app to read how many lumens fall in your room, classroom, school….

The recommended LUX for a classroom is 300 Lux for Young people. Why not map out your class and see what LUX is in your room.

Then, learn when its Bright with natural light, turn of the lights.

Some secondary school Science labs have light meters which you could use to measure light. Like this one

To get started, we need you to do 2 things. First, download the lux meter app on your phone or school tablets (there are lots of free options) and second, draw a map of the room. The map does not have to be exactly to scale. A rough approximation will do but you should try to include the main features of the room, like furniture, doors and windows. Use the LUX meter to find reading and mark them down on the map. Use a light meter to measure and record the amount of light in Lux in the room

Actions link well with Science subjects as well as Geography curriculum.

Energy Theme:
Learning About Light:

Sample Classroom Map

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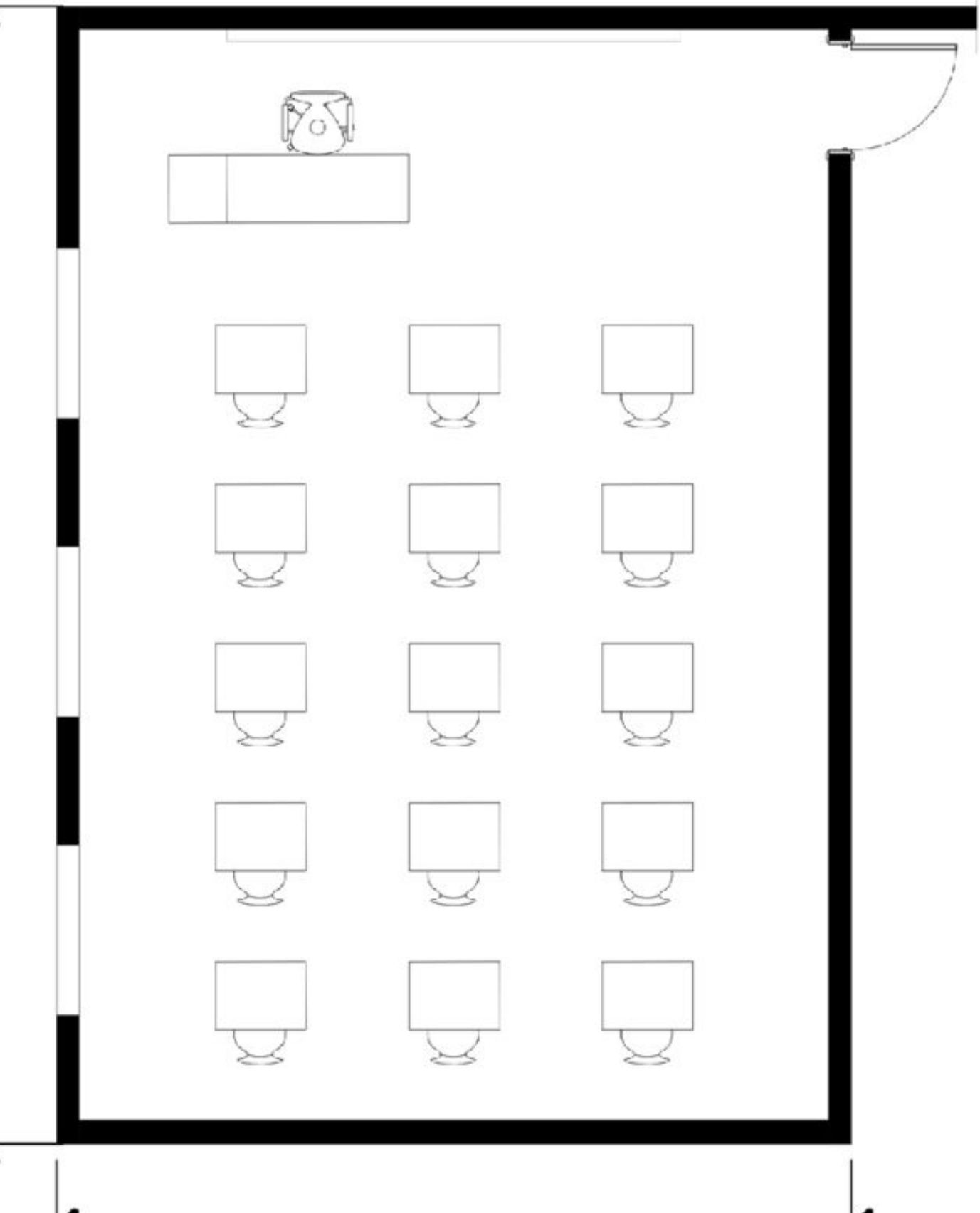
Map out the blithest and darkest spots in the room.



Energy Theme:
Learning About Light:

Sample Classroom Map

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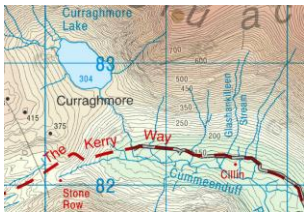
Map out the blithest and darkest spots in the room.

One way of visually representing data you collect is to draw an isopleth map.

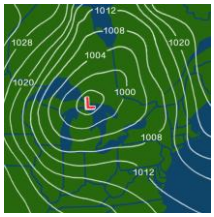
Isopleth maps are maps in which lines (isolines) are drawn to link places that share a common value.



Examples of isolines are contours on an OS map and isotherms (temperature), isobars (barometric pressure), isohyets (rainfall) and isohels (sunshine amount).

An isopleth map is a map which shows a gradual change in values throughout a space.

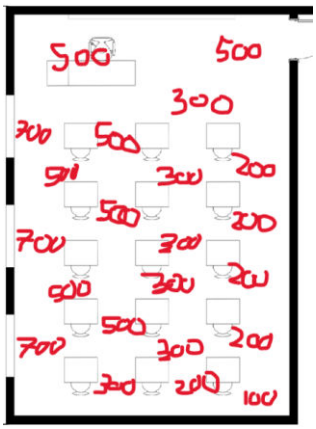
Gather data and mark values as points on the map

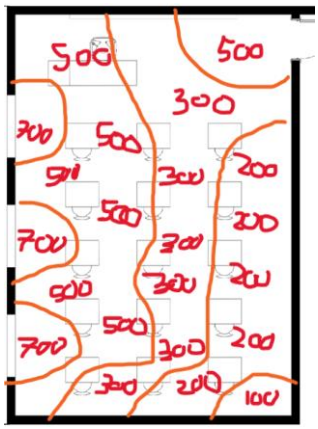


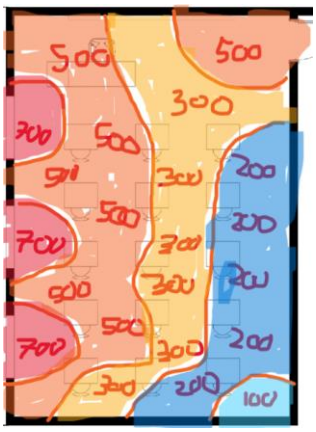
Based on the distance between each reading determine where the relevant isoline(s) should be drawn – Round up or down where needed.

Continue drawing the isolines, bringing each one to the edges of the ,room map

You can take it a step further and assign Colours to each area.







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Learning About Light:

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Below is a table of the Standard Lighting Levels for School Buildings. Find out if your school meets the standards and see if you can make any changes to reduce the use of artificial lighting.

School space	Lux
Canteen	200-300
Classroom	300-500
Science Lab	500 - 750
Hallway	50-100
Gym	300-500
Kitchen	500-750
Library – work desks	300-500
Library - shelfs	200-500
Lobby	200-300
Locker Room	100-300
Breakroom	100-300
Office (Private)	100-300
Office (public)	200-300
Restrooms	100-300
Stairways	50-100
Storage Rooms	50-200
Workshops	300-750

Start with **No Cost to Low Cost,** actions:

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