

# Power your School

## Information

In Partnership with the Energy Mapping Project

### Overview:

#### Pupils will have the opportunity to do the following

- Map their school and local area.
- Predict where the best sites for solar panels might be.
- Use scientific equipment accurately, recording results and making conclusions.
- Calculate the financial benefits of solar panels over a few years.
- Investigate the benefits of renewable energy.
- Use their English debating and design skills to create a poster to persuade the governors into investing in renewable energy.



## Background Information

### Energy Mapping Project

Solar Power Education has partnered with Beth and Stuart from The University of Cambridge and EPSRC to offer the schools we support an opportunity to collect energy data from your local environment (your school) to create a countrywide picture of energy usage.

Eligible schools will be given a login and can add their own data to the [Energy Mapping website](#). Children will become scientific researchers and experience for themselves the importance and potential of renewable energy by taking scientific measurements in their own playground.

Solar Power Education will provide the resources necessary for your pupils to take part in this fabulous project. We recommend this as a Year 6 or mixed Key Stage 2 project to be completed in the second half of the summer term or the first half of the autumn term.

Please contact your Solar Power Education Officer or email [info@solarpowereducation.com](mailto:info@solarpowereducation.com) for more information.

Beth and Stuart have made [an Instructional Video](#) giving background information and tips to complete this project and work scientifically.

## Additional Info about Solar Power

[Facts about solar power](#)

[BBC Bitesize information on renewable energy](#)

# Assessment Quiz

There is a **short assessment quiz** included at the beginning of the pupil's investigation booklet. Please can you carry this out and keep a record of the percentage of correct or plausible answers from your class before the project and again at the end. If you would like you can record the results below:

Question	% correct at beginning	% correct at end
What is energy?		
List <b>three</b> things that you use every day, that require energy.		
Give a reason why we care about solar and wind energy.		
Which do you think would be better for <b>your</b> school? Why?		
How do solar panels work? <b>Circle your answer.</b>		

## Activities

- Pupils to map the school grounds and possibly a small section of the local area.
- Pupils to predict 3 areas which could be most suitable for a solar panel.
- Pupils use scientific equipment to take light measurements.
- Pupils calculate the savings that the school would benefit from because of having solar panels.
- Pupils to put together a persuasive poster on the benefits of solar energy.

## Equipment

Pencils, rubbers, rulers.

Computer/iPad with access to Google Earth

Local maps

Clipboard

Digital wind speed meter and luxmeter

Pupil's investigation booklet

Instructions on using the Luxmeter and the digital wind speed meter.

Energy Mapping login details if relevant.

## Vocabulary

### Renewable

Renewable energy is made from resources that nature will replace, like wind, water and sunshine.

### Non-renewable

A non-renewable resource is a natural resource that is used up faster than it can be made by nature.

### Map

A map is an image or drawing of an area which shows where things are

### Bird's Eye View

A view seen from high above, looking down.

**Instructions on using the Luxmeter and the digital wind speed meter are included. We recommend you watch the [Instructional Video made by Beth and Stuart.](#)**

# 1) Mapping the School's Local Area

- Discuss what a 'bird's eye view is' and from what angle this map will be drawn. Look at 'Google Earth' and zoom in from above.
- Take children out to walk around the school, playground and immediate local area. On clipboards they can roughly sketch what the layout is and any key features. If possible they could include: building layout, playground equipment, playing fields, gardens, paths, local roads, and any interesting buildings.



An example of a map

## 2) Where would the Solar Panels go?

- Pupils to discuss what they already know about renewable energy, in particular solar energy and solar panels. What do they think solar panels need in order to work well?
- Once pupils' ideas have been elicited then discuss the different considerations listed on the worksheet for example, is anything obstructing the sun's light from hitting that area?
- Before finally deciding on 3 test sites remind children that a roof is often the best place for a solar panel, as it has the most exposure to the light, so everyone will need to be safe when collecting data. Therefore, they either need to be able to see it from a safe place or have safe access to that area.
- Go through the table and discuss how to make this a fair test. For example, discuss what times they are going to take the light readings.
- Practise using the Luxmeter and other equipment in the classroom.
- Remember to keep a record of your readings. If you have an Energy Mapping login you will upload your results onto the website or you can email your results directly to us.

### 3) Solar panels are good for the environment, but will they end up being more expensive than your school's normal electricity bill?



*The following figures are approximate estimates and how much electricity bills are and the cost of solar panels will be different for every school.*

*This gives some examples of what your pupil's calculations might look like.*

Solar panels for a school cost £650 per month for 3 years, then they belong to the school and all the electricity the school gets from them is free.

If solar panels cost £650 per month how much will they cost for 1 year?

*£650 multiplied by 12 months =  
 $650 \times 12 = £7,800$  So the solar panels will cost £7,800 per year.*

How much will the solar panels cost in total over the 3 years?

*£7800 x 3 years = £23,400  
Or  
£650 x 36 months = £23,400*

#### Information about electricity bills

A 1 or 2 form entry primary school will be £280 per month

A 3 or 4 form entry primary school will be £350

How much is your school's electricity bill for 1 year?

*If you go to a 2 form entry primary school...  
£280 x 12 = £3,360*

How much is your electricity bill for 3 years?

*£3,360 x 3 years = £10,080  
Or  
£280 x 36 = £10,080*

How much more is it to have solar panels then pay the electricity bill for the first 3 years?

*Cost of solar panels minus electricity bill =  
£23,400 - £10,080 = £13,320  
So the solar panels cost 13,320 more after 3 years.*

To start with the solar panels are more expensive, but after those 3 years the school does not have to pay for the solar panels. This means within 10 years the solar panels are cheaper. As a super challenge can you work out how many years you need solar panels to make it cheaper than normal electricity bills?

*Every year the school's electricity bill is £3,360  
The total cost of the solar panels is £23,400*

*So once the total electricity bill is greater than £23,400 the solar panels are a cheaper form of electricity.*

*Electricity bills: 1 year = £3,360, 2 years = £3,360 x 2 = £6,720 ..... 7 years = £23,520 which is more than the £23,400 for the solar panels*

4) As pupils you will need the School Governors' support so that they approve the budget being changed and the money being spent on the solar panels.

**The following ideas will help to create a persuasive poster:**

- Solar energy does not cause pollution. It is an environmentally friendly alternative to fossil fuels
- Solar energy is infinite. It is renewable and sustainable
- Once the equipment to collect it has been built, solar energy is free
- Once installed solar panels are low maintenance and just need a quick clean

5) Problem! What do we do if it is not sunny? There are other renewable energy sources too which may be more suitable for your school. Depending on your area would a wind turbine be a better alternative for your school?

**Pupils carry out a similar experiment to the solar panel investigation but instead it is with wind power. At the end there are opportunities for:**

- **Investigating** the costs for the school of investing in a wind turbine.
- **A debate** – the class are divided in half and one side argues in favour of the school having a wind turbine and the other a solar panel.
- **Writing to the local M.P.** persuading him/her to help find funding for a renewable energy source for the school.

# Safety

**Never Look directly at the sun.**

Harmful light from the sun can cause permanent damage to your eyes, even when wearing sunglasses. All sunlight measurements will be carried out with your back to the sun, to maximise safety and minimise risk.

## National Curriculum Areas Studied

### *Geographical Skills and Fieldwork*

- use maps, atlases, globes and digital/computer mapping to locate countries and describe features studied
- use fieldwork to observe, measure record and present the human and physical features in the local area using a range of methods, including sketch maps, plans and graphs, and digital technologies

### *Science*

- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by an opaque object
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations

### *English*

- identifying the audience for and purpose of the writing, selecting the appropriate form and using other similar writing as models for their own

## People who use these Skills for Work

Beth and Stuart are **scientists** developing innovative new ways to generate electricity from the sun. Did you know they can make solar panels that are 100x thinner than human hair! Since these are so cheap and lightweight, one day they will be generating electricity in the most remote parts of the world, and maybe even for spaceships. You can read more about them on our [website](#).

A **Solar Panel Salesman** will come to your house and identify whether your house could have solar panels and tell you how much they will cost. They use maths in their jobs.

A **Local Counsellor** will look at any plans to install solar panels to see if they are a good decision for their local community. They look at arguments and weigh them up.