

Opinions about Climate Change

Cut out the writing and pictures. Match the opinion to the person. Stick down on a new piece of paper.

OIL EXECUTIVE



I've been flying planes for over 20 years and I don't believe that people should be so hard on themselves about climate change. Some figures say that one hour's flying per passenger releases the same amount of CO₂ as a person in Bangladesh in a whole year, but I think that everyone deserves a holiday.

PILOT



Climate change means that we'll have to adapt the way that we live and this could be very expensive for the country. If the government has to spend lots of money on climate change there could be less money for schools and hospitals. It is difficult for me to spend money on climate change when there are other things we need to spend it on.

POLITICIAN



If the climate in Britain gets a little bit warmer then my crops might grow better all year round. However, if the climate gets too hot, I might not be able to grow any of my crops at all and I will have to think about growing something different.

BRITISH FARMER



I know that climate change is going to affect everyone and sooner than you think. At the moment, it is affecting the poorest people but soon sea levels will rise, water will be scarce and we will be powerless to stop it. We must act now!

ENVIRONMENTAL
ACTIVIST



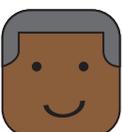
Because of climate change, I have already noticed there is less fresh water available where we live because we are near to the desert. I need water not only for my family but also for my crops. If I don't water my crops, they won't grow and I won't make any money.

SCHOOL CHILD



My business is doing great! We're digging lots of fossil fuels and they're selling for a lot of money because people are starting to panic that they will run out soon.

KENYAN FARMER



I do get worried thinking about climate change. Scientists say it is probably going to affect me more than my parents, but sometimes this makes me angry because I wasn't even born when it started happening.

Definitions

With your partner, pick one of the boxes below. Put the words into sentences to create a definition. To help, you could try writing the words onto pieces of paper and arranging them into groups.

When you are happy with your definition, read it to another pair and see if they can guess which phrase you are defining.

Climate Change

hotter faster
 flooding drought
 drier time
 weather cooler
 unpredictable

Fossil Fuels

coal, oil and gas
 millions of years
 CO₂ burning
 carbon energy
 plants and animals

Greenhouse Effect

CO₂ sunlight
 atmosphere hotter
 gases temperature
 heat escaping
 trapped faster

Carbon Sinks

trees and plants
 atmosphere CO₂
 store oxygen
 greenhouse effect
 breathe

What is your family's attitude to energy?

	YES	SOMETIMES	NO
Do you usually walk or cycle to school?			
Do you turn off the lights when you leave a room?			
Do you take more showers than baths?			
Do you recycle as much as you can?			
Do you use any energy saving light bulbs in the house?			
Do you wait for a full load before running the washing machine?			
Do you turn off the TV when you are not using it?			
Do you turn off the computer when you are not using it?			
Do you watch TV or play computer games for less than 1 hour a day?			
Do you only boil the amount of water you need in the kettle?			
Do you unplug your mobile phone chargers when you are not using them?			
Do you switch appliances off at the wall instead of leaving them on stand-by?			
Do you try to walk to the shops when you buy food?			
When it is cold, do you put on a jumper instead of turning the heating up?			
Do you go on holiday in the UK instead of abroad?			
Do you use green energy at home? e.g. solar, biomass			

If you ticked mostly YES and SOMETIMES then you are already doing brilliantly at saving energy. Can you think of any new ways to reduce your energy use even more?

If you ticked mostly SOMETIMES or a mix of YES and NO then you are already doing quite well. As a family, are there things you can change so you can start to answer yes to more questions?

If you ticked mostly NO then perhaps you could think of some ways to start saving energy now. There are some simple and easy ways of changing your behaviour slightly that will have a big effect on your energy use – and your energy bills! Try pledging 5 small changes you can make as a family.

If you would like to calculate your carbon footprint at home, you could try using these websites:

http://www.planet-positive.org/how_2_kidscalculator.php (for kids)

<http://carboncalculator.direct.gov.uk/index.html> (more difficult, ask an adult to help)

Energy use

Nearly 70% of our electricity comes from power stations which burn fossil fuels. This puts a lot of carbon dioxide into the air so we need to think carefully about how we use electricity. The less electricity we all use the more we can reduce our carbon footprint and help the planet.

Electrical appliances like TVs and computers use power which is measured in watts. When the number of watts gets bigger we use kilowatts instead: 1000 watts = 1 kilowatt.

Use the table below to work out how much energy is used per day and per year by different appliances. You will need to fill out how many hours you use them. The first two have been done for you.

Appliance	Power needs	Hours used per day	Energy used per day in watt-hours	Energy used per year in kilowatt-hours (kWh)
Washing machine	500 watts	1 hour	$500 \times 1 = 500$ watt-hours	$(500 \times 365) \div 1000 = 182.5$ kWh
TV	150 watts	3 hours	$150 \times 3 = 450$ watt-hours	$(300 \times 365) \div 1000 = \underline{\hspace{2cm}}$ kWh
Computer	225 watts			
Games console	175 watts			
Fridge	400 watts			

On average, 1kWh of energy costs 15p. So how much does it cost per year to run the washing machine?

$$182.5 \times 15p = 2738p = \pounds 27.38$$

How much does it cost per year to run the computer in your house?

$$\underline{\hspace{2cm}} \times 15p = \underline{\hspace{2cm}} p = \pounds \underline{\hspace{2cm}}$$

How much does it cost to run the games console and the computer altogether?

And how much does it cost per year to run the fridge?

Extension: How much money would you save in a year if you used the TV for 2 hours a day instead of 3?

Stop Stand-by!

You may notice on some appliances we use, like TVs and stereos, that when you switch them off they have a little red or orange light shining. This is because the appliance is on **stand-by** and has not been **switched off properly**. This means it is still using energy. **What a waste!**

So let's work out how much energy we are wasting when we leave things on stand-by.

Use the table below to work out how much would be wasted if the item was left on stand-by for one day and one year, without being used. The first two have been done for you.

Appliance	Power used on stand-by	Energy wasted in one day (24 hours) in watt-hours	Energy wasted in one year (365 days) in kilowatt-hours (kWh)
TV	10 watts	$10 \times 24 = 240$ watt-hours	$(240 \times 365) \div 1000 = 87.6$ kWh
Games console	3 watts	$3 \times 24 = 72$ watt-hours	$(72 \times 365) \div 1000 = \underline{\hspace{2cm}}$ kWh
Computer	7 watts		
Stereo	10 watts		
Mobile phone charger	1 watt		

We know 1kWh of energy costs 15p. So how much money are we wasting by keeping things on stand-by? Let's work out how much it costs per year to leave a TV on stand-by:

$$87.6 \times 15\text{p} = 1314\text{p} = \text{£}13.14$$

Wow, so we could save £13.14 a year JUST by switching the TV off at the wall.

But we're not just worried about the cost, we also need to think about carbon dioxide. On average, using fossil fuels to make 1kWh of energy creates 0.5kg of carbon dioxide.

Let's work out how much carbon dioxide is created by keeping a TV on stand-by for a year:

$$87.6 \times 0.5\text{kg} = 43.8\text{kg}$$

So how much carbon dioxide is created by leaving a computer on stand-by for a year?

$$\underline{\hspace{2cm}} \times 0.5\text{kg} = \underline{\hspace{2cm}} \text{kg}$$

And how much carbon dioxide is created by leaving a games console on stand-by for a year?

Brain teaser: How much carbon dioxide would you save if you switched off at the wall all of the appliances listed in the table?

Solar Circuits

Solar circuits work like normal circuits except the battery is replaced with a solar cell which is powered by sunlight. Work in pairs to build your own solar circuit.

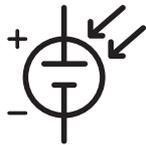
You will need:

- An LED (bulb)
- 2 crocodile clip wires
- A PV solar panel

Instructions to light an LED

1. Gently bend the 'legs' of the LED outwards.
2. Attach the longer 'leg' of the LED to the positive wire on the solar panel using a crocodile clip wire.
3. Attach the shorter 'leg' of the LED to the negative wire on the solar panel, ensuring the crocodile clips do not touch. (Note: the LED will not work if it is attached the other way round)
4. Place the solar panel in direct sunlight or close to a desk lamp and see the LED light up!

This is the symbol for a solar cell.



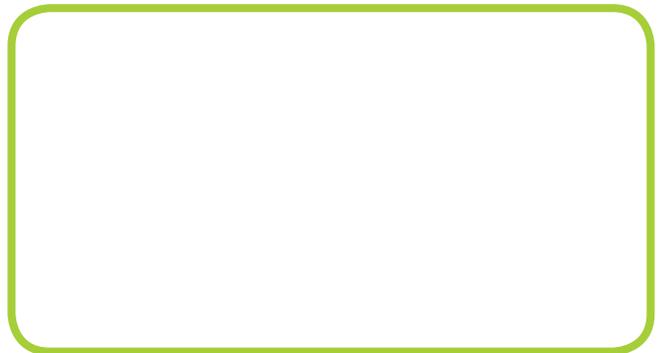
This is the symbol for an LED.



Draw a picture of your circuit.



Now draw a diagram using symbols.



When you tested your circuit, what happened to the brightness of the LED when you moved it further towards the light or further away from it? Describe what you saw.

Troubleshooting – if your bulb won't light up, double-check:

- the LEDs are connected the right way to the panel,
- the crocodile clips are not touching each other,
- the panel is in direct sunlight or very close to a desk lamp.

Solar Circuits - Extension

Now join together with another group and try adding the components together to make different circuits. Try creating these circuits, then drawing them in the boxes using symbols:



1 panel with 2 LEDs



2 panels with 1 LED



2 panels with 2 LEDs

What did you notice about the brightness of the LEDs with the different numbers of panels? Write what you found out below:

If your teacher has buzzers, try using one in the circuit instead of the LED. What happens to the noise as you move the solar panel nearer the light or further away from it?

Did you know...?

- In solar lights, like the ones you might find in a garden, the solar cell is linked to a battery which is charged during the day by the sunlight. This means that the electricity is stored and can be used to turn on lights when it is dark, even though there is no sunlight.
- Most solar cells can last 25-30 years without losing efficiency.
- PV solar cells are made from an element called silicon which comes from sand. Silicon from one ton of sand used in PV cells could produce as much electricity as burning 500,000 tonnes of coal.
- Most satellites in space are powered by solar cells.