



ENERGY PROJECTS

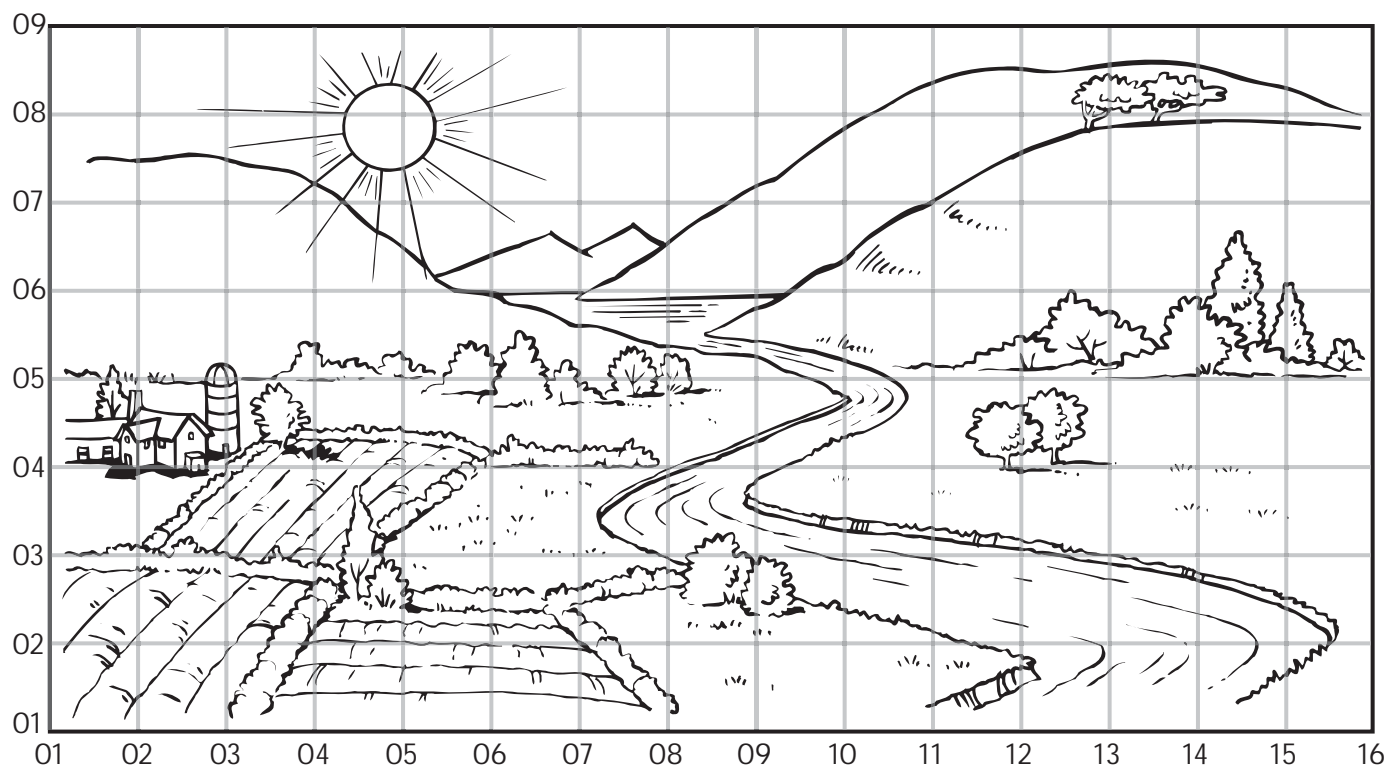
NAME: _____

You have just started working for an energy company. The company wants to use more natural resources to produce electricity. Why? It wants to help the UK reach a more balanced 'energy mix'. This means not relying too heavily on just one or two energy sources. This is really important for the future so your job is an important one.

YOUR MISSION: To choose the best sites for four renewable energy projects.

- 1** Wind farm **2** Hydro-electric power station **3** Solar panels **4** Biomass

Mark X on the picture below for each of the locations you choose. Also write down the name of the type of energy next to it.



ENERGY PROJECT

REASONS FOR CHOOSING THE LOCATION

1 Wind farm

Grid Reference

X= Y=

2 Hydro-electric power station

Grid Reference

X= Y=

3 Solar panels

Grid Reference

X= Y=

4 Biomass

Grid Reference

X= Y=

CREATING ELECTRICITY: HYDRO-ELECTRIC



Surfers are well aware of the force of the water.

Hydro-electric energy uses the power of flowing water to produce electricity from rivers and reservoirs. As water flows down rivers or is released from reservoirs, the force of the water drives a turbine and produces electricity - it's a highly developed version of the water wheel!

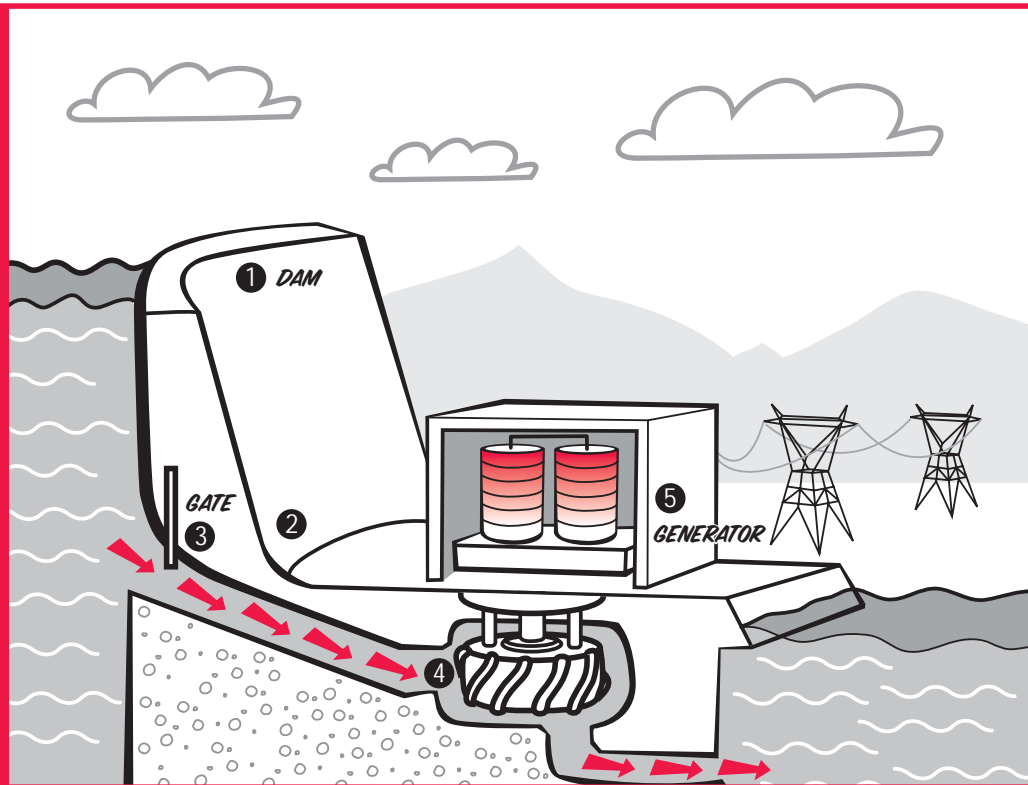
Man has been using the water wheel as an energy source for thousands of years.

HOW HYDRO-ELECTRIC ENERGY IS CREATED

Hydro-electric power stations use simple mechanics to convert energy into electricity.

The diagram below explains how a reservoir hydro-electric power station works.

- 1 Most hydro-electric power stations rely on a dam that holds back water, creating a large reservoir.
- 2 The dam is much thicker at the bottom than at the top. This is because the pressure of the water increases with depth.
- 3 Gates on the dam open and water is allowed to flow through a pipeline that leads to the turbine.
- 4 The water strikes and turns the large blades of the turbine which drives the generators.
- 5 The generators produce electricity.



ADVANTAGES OF HYDRO-ELECTRIC ENERGY

- ★ It is a renewable source of energy.
- ★ Hydro-electric energy does not pollute the water or the air.
- ★ Water can be stored above the dam so that we can control when electricity is made.
- ★ It is reliable and has a long life span.

DISADVANTAGES OF HYDRO-ELECTRIC ENERGY

- ★ It is difficult to find suitable sites for large-scale hydro-electric projects.
- ★ Where a dam is needed this can be very expensive to build.
- ★ When the weather is very dry, less electricity is generated.
- ★ Some people feel the pipes that carry the water downhill from the reservoirs spoil the landscape.



CREATING ELECTRICITY: BIOMASS

When we eat, we can feel the energy food gives us. Did you know that plant and animal products can be used to make electricity too?

Biomass fuels are fuels from living things such as trees, plants and animal litter. They are a very adaptable source of energy. Ever since the discovery of fire, they have been used by humans for heating and cooking. Today, biomass fuels can be used to make electricity and vegetable oil can even be converted into fuel for cars!

As long as we continue to plant new trees to replace those cut down, we will always have a supply of biomass fuel.

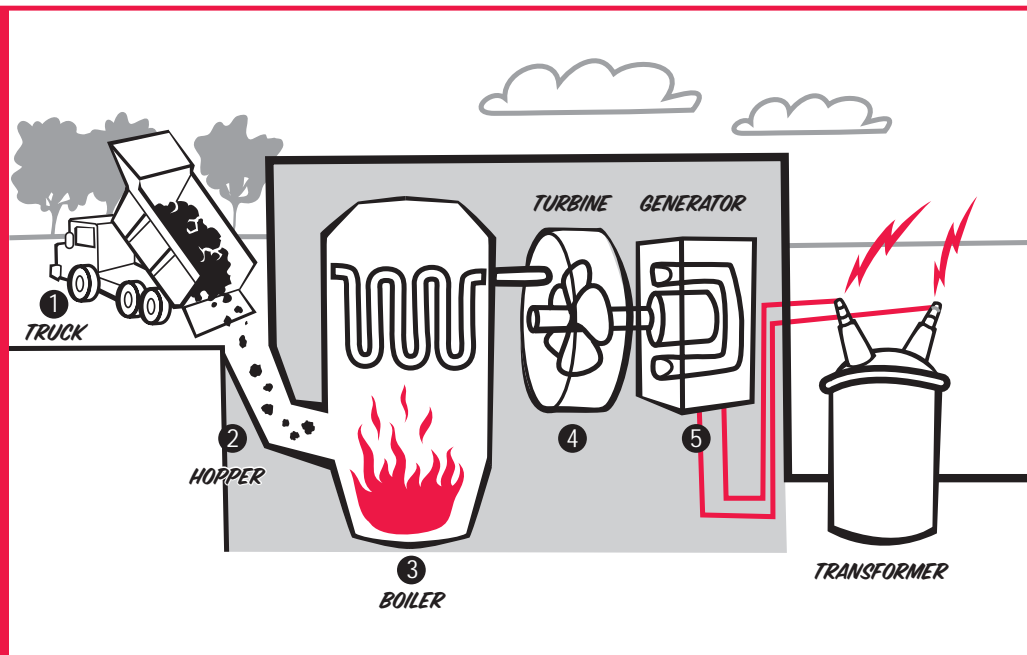
HOW BIOMASS FUELS CREATE ELECTRICITY

Everything living on Earth needs the sun's energy to grow. The energy stored in biomass fuels comes from the sun. When the fuel is burnt it releases energy in the form of heat.

Scientists are looking at growing special biomass crops that are very high in energy. This means they will produce more heat when they are burnt to create more electricity.

The diagram below shows the main stages in generating electricity from biomass fuels such as wood, crops and manure.

- ① The biomass is gathered together in trucks and taken to the biomass power plant.
- ② The truck unloads the biomass into huge hoppers.
- ③ The biomass is burned to create heat to boil water in the boiler.
- ④ This produces steam that turns the turbine.
- ⑤ This spins the generator and electricity is created.



ADVANTAGES OF BIOMASS

- ★ Biomass is a natural resource so will not run out.
- ★ It does not add to global warming.
- ★ Biomass can be stored easily so can reliably produce electricity when it is needed.

DISADVANTAGES OF BIOMASS

- ★ It needs land for the trees and plants to grow.
- ★ It needs to be transported to the power stations.
- ★ A lot of biomass fuel is needed to generate electricity that meets our energy needs.

CREATING ELECTRICITY: SOLAR POWER



Energy from the sun heats you up and makes you feel hot on a sunny day.

Energy from the sun is called solar energy. It can be used as a source of heat and also to make electricity. The sun's energy is so powerful that the sunlight that shines on Earth in just one hour could make enough energy to meet the world's energy demands for a whole year.

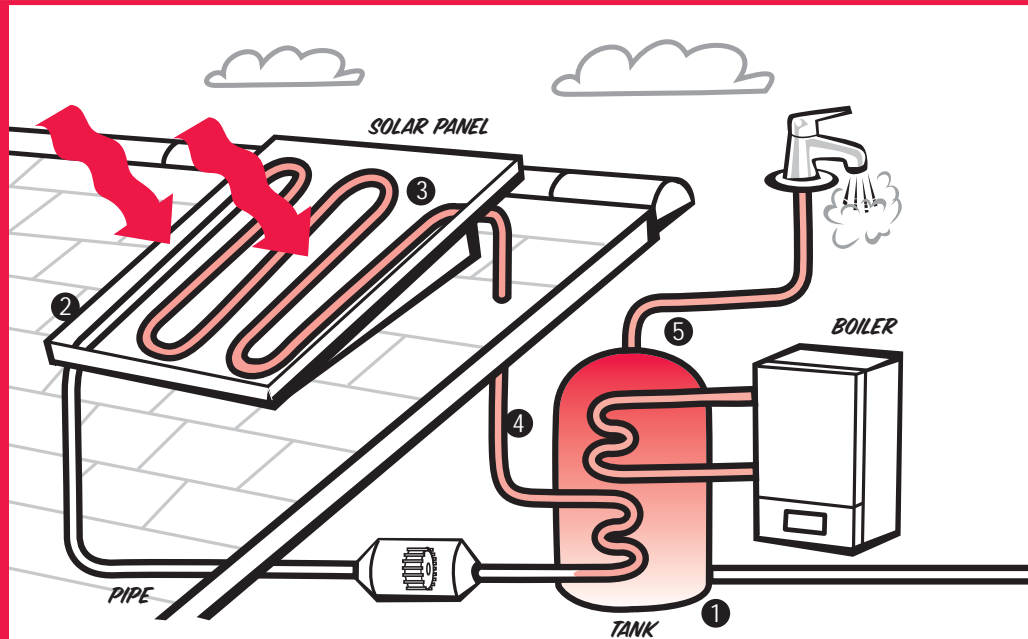
Solar energy can be captured in solar cells or solar panels.

HOW SOLAR ENERGY CREATES ELECTRICITY

Solar cells change the energy in the sun's light into electrical energy. This process is called photovoltaics. A solar powered calculator uses solar cells. As long as there is light, your calculator will work. The electrical power from the cells flows through wires to make it work.

Solar panels are large black panels, covered in glass. The panels collect sunlight and convert the energy from light into heat energy. They are black because this colour absorbs the most heat from the sun's rays. Some homes use solar panels to boost their heating.

- ① Cold water held in a storage tank is pumped up to pipes in the solar panels.
- ② The solar panels are fixed to a roof or high spot in direct sunlight.
- ③ As the cold water flows through the pipes it is heated by the sun.
- ④ The heated water flows from the pipes in the solar panel to a hot water storage tank.
- ⑤ The hot water is then stored until it is ready to be used.



ADVANTAGES OF SOLAR POWER

- ★ Solar power is very versatile. It can be used to power very different items such as solar cars, satellites and calculators.
- ★ There are no harmful pollutants created by solar power.
- ★ It is a renewable source of energy.
- ★ It is a great energy source for isolated places that cannot easily get electricity in the usual way.

DISADVANTAGES OF SOLAR POWER

- ★ Solar power stations are very expensive to build and need very large amounts of open space.
- ★ The cost of making a solar cell is high when it is measured against how much electricity it will produce in its lifetime.
- ★ Solar power cannot be produced at night time.
- ★ You can only rely on solar energy as your 'only' energy source if you live in a sunny country.