



QUEEN
ELIZABETH
Country Park

Sustainability

A Teachers' Resource
Pack

Fossil Fuels

Nuclear Energy

Wind Energy

Solar Power

Water Power

Biomass Energy

Organic Farming

Intensive Farming

Recycling

Organic Toilets



This resource pack was funded by the Ernest Cook Trust

www.hants.gov.uk/countryside/qecp



Hampshire
County Council



Forestry Commission
England

Sustainability

Queen Elizabeth Country Park is Hampshire's biggest country park, with 1,400 acres of woodland and downland set in a wider landholding of 2,100 acres. The park has over 20 miles of trails for walkers, cyclists and horse riders.



Queen Elizabeth Country Park demonstrates a working example of how landscape management can integrate wildlife, farming, forestry and recreation in a way that is sustainable.



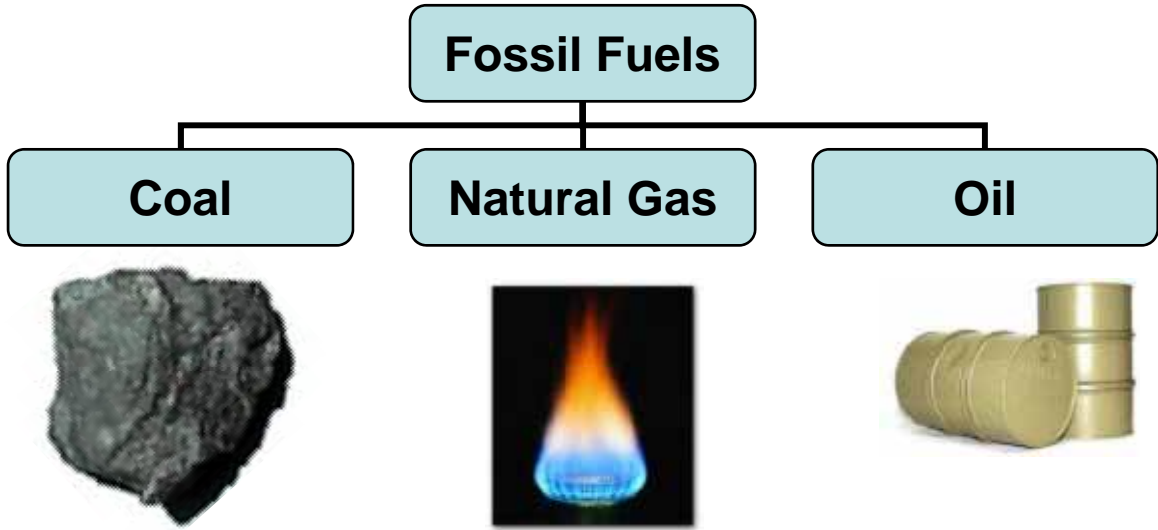
This pack, funded by The Ernest Cook Trust provides a educational resource for teachers and group leaders to aid in the teaching of topics such as non-renewable and renewable energy, farming and recycling.



INFORMATION SHEET

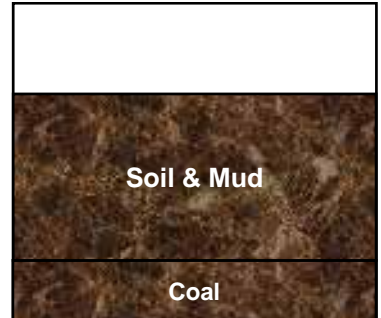
Fossil Fuels

Fossil Fuels are natural resources found in the ground. They are Coal, Natural Gas and Oil.



Coal

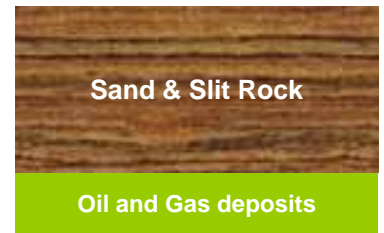
Coal is the remains of tree-like plants that grew millions of years ago. When the trees died, they fell and eventually were covered by new layers of vegetation. The remains firstly turned into peat, then as more mud and soil built up, the air and water was squeezed out. As the material was compressed over many thousands of years it hardened and turned into coal.



INFORMATION SHEET

Gas and Oil

Gas and Oil are the remains of tiny sea plants and creatures called plankton. These creatures lived millions of years ago. When they died they sank to the seabed where they were covered by layers of sand and mud. Gradually the remains turned into black sticky oil or pockets of natural gas.



Gas and Oil are used in two ways

They are burnt to produce heat

Or

They are **processed in oil refineries** to make lots of different materials, such as pens, paint and mobile phones.



Did you Know?

The heat given off by fossil fuels is used in power stations to make electricity.



The electricity that powers fridges, freezers, lighting and heating within a supermarket all comes from the burning of fossil fuels.



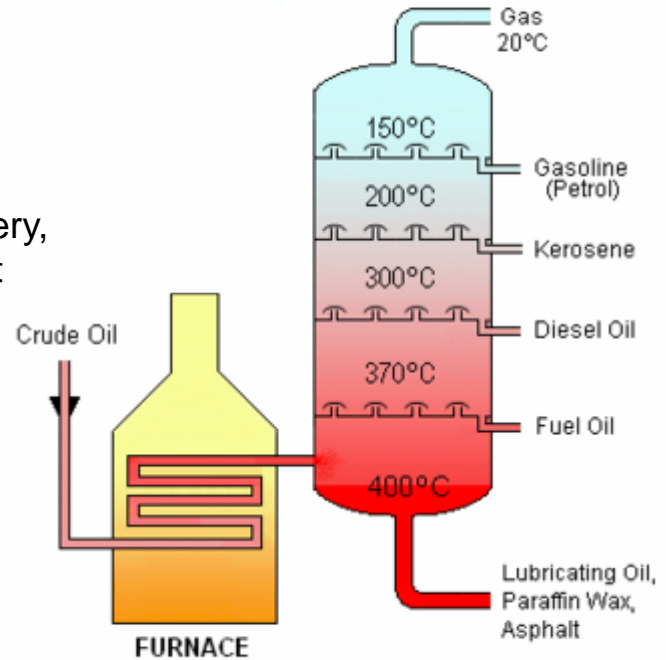
INFORMATION SHEET

Fossil fuels are not used in their natural state: they have to be processed to change them into useful materials

Did you Know?

Oil is also called **Crude oil** or **Petroleum**



The Crude oil is processed in an oil refinery, where it is filtered into a variety of different liquids and gases that are more useful in everyday life.






We use petrol and diesel for our cars, kerosene is used to fuel planes so that we can go on holiday and we use gas every day to cook with. All of these fuels come from oil.



Advantages of using Fossil Fuels

-  They are cheap
-  They burn easily

Disadvantages Of using Fossil Fuels

-  One day they will run out
-  Accidents involving oil tankers and drilling rigs pollute the sea and kills wildlife.
-  Burning fossil fuels causes pollution

INFORMATION SHEET



Nuclear Power

Nuclear power uses a rare metal called **Uranium** as fuel

Tiny particles of Uranium called **Atoms** are split . This causes a chemical reaction which produces energy.

How does it work?

Nuclear Fission makes heat → Heats water to make steam → Steam turns turbines → Turbines turn the generators → Electrical power is sent around the country

Uranium is radioactive and gives out harmful rays of energy. This means that the raw Uranium has to be mined and transported very carefully and under strict supervision.



Nuclear energy is generated in power stations. The fuel is used to create steam which powers the generator to make electricity.



Nearly a third of Britain's electricity is generated by Nuclear energy.



Nuclear power is used to power most military submarines and aircraft carriers.

INFORMATION SHEET

Nuclear Power



The Advantages



Nuclear power is cheap to make, it costs the same as coal.



Does not produce smoke or Carbon Dioxide, so it doesn't contribute to the green house effect.



Using small amounts of fuel can produce large amounts of energy.



Produces small amounts of waste.



Nuclear Power is reliable.

Nuclear power produces around 11% of the world's energy needs, and produces huge amounts of energy from small amounts of fuel, without the pollution that you'd get from burning fossil fuels.

The Disadvantages



Nuclear energy produces a harmful waste product which is very difficult to dispose of it safely. The waste must be sealed and buried underground for many years to allow the radioactivity to die away.



Nuclear power is reliable but a lot of money has to be spent on safety. If an accident did happen it could be a major disaster.

Due to its harmful state the radioactivity levels around nuclear power stations are regularly measured to ensure safety.

Action Zone

Discussion Point – How safe do you think Nuclear Power Is?

INFORMATION SHEET

Wind Energy

Wind is a renewable energy. This is because the wind will always blow. It produces **Kinetic** energy that drives machinery to produce electricity.







Machines called **wind turbines** harness the energy produced by the wind. These turbines turn generators which make electricity.

Wind Farms

A wind farm is a collection of wind turbines, they are most reliable when situated in very windy areas such as along the coast.




Wind Turbines can be used to produce energy in your own home, they are also used to power road signs.

Advantages of Wind Energy

-  Wind Turbines do not need fuel to run them.
-  They do not produce any pollution.
-  Once the turbines have been built their running costs are low.
-  Turbines only need replacing every 25 years



Disadvantages

-  They are not reliable
-  They have to be turned off in very strong winds
-  They are expensive to install
- They are a hazard to birds



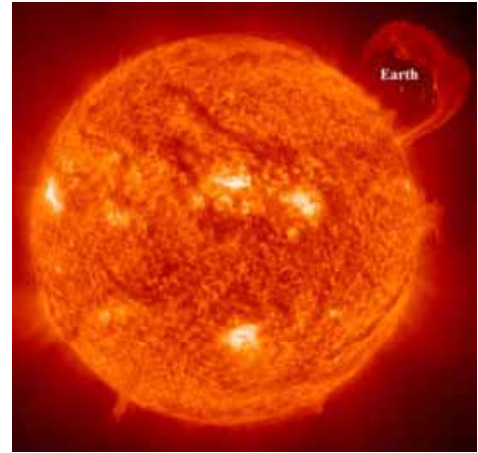
INFORMATION SHEET

Solar Power

Solar energy is energy released from the sun as heat and light.

Without this form of energy our planet would be freezing and nothing would live on it.

Solar energy can be converted directly or indirectly into other forms of power such as heat and electricity.



“The sun is the biggest source of renewable energy, if we harnessed just 1% of the sun’s energy that hits the earth, all our energy needs would be met”. Chris Oxlade

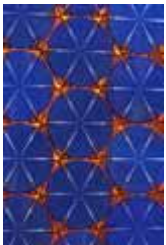
The sun is packed with energy. In one hour, the earth receives more energy from the sun than all the people in the world use.

How do we harness this energy?

To efficiently collect enough energy from the sun, large collectors called solar panels are used. Solar panels catch the sun’s heat and change it into electricity using solar cells.








Solar Cells






When light is absorbed by a solar cell, tiny particles called electrons are released. They move creating an electric current. When these cells are joined together they are referred to as a solar panel

INFORMATION SHEET





Solar Power is used for

-  Heating for domestic use
-  Heating Buildings
-  Drying Agricultural Products
-  Generating Electrical Energy
-  Street Lights & Road signs

Advantages of Solar Power

-  It is a renewable energy.
-  It does not produce any pollution.
-  Solar power is free.

Disadvantages

-  You cannot get solar power at night.
-  Solar equipment is expensive.
-  Batteries needed to store the electricity for the night are expensive.
-  Solar cells are not very efficient.



Action Zone

- Q How would your home or school benefit from solar power?
- Q What would be the benefits of having solar power?

INFORMATION SHEET

Hydroelectricity – Moving Water

Flowing water has been used as a source of energy for more than a thousand years. The kinetic energy in moving water can be used to drive machinery such as electric generators. It is considered a renewable energy source as it uses the earth's water cycle to generate electricity.



Hydroelectric Dams



Hydroelectric schemes use huge dams to block a river to create a lake. The water is then released through tunnels. Within these tunnels are generators. The power from the flowing water turns the turbines creating electricity. The further the water has to fall the more energy is produced. This is why many dams are built in hilly areas where the rainfall and drop is increased.

Small scale Hydro-Schemes

Local hydro-electricity schemes built on a stream can be very effective and provide enough electricity for a whole village, factory or farm without building a dam or having to flood farms.

Did you Know?



Here at Queen Elizabeth Country Park all the rain water that falls on the visitor centre roof ends up in the adjacent pond.



The Park uses 2,500 cubic metres of water, half of which comes from a borehole

Action Zone

Q. List items that use water within the household or school.

INFORMATION SHEET

Tidal Power

Tidal Power uses the tides to create electricity.

The moon's gravity pulls the earth's water towards it, this makes the sea levels rise whenever the earth is facing the moon. However, everywhere else the sea level goes down creating a low tide.

To harness the power within the sea's movement tidal barrages are built.

A tidal barrage is a dam which traps water in pipes within the barrage. At high tide the water is trapped within these tunnels and as the tide goes out the water turns turbines which turn the electricity generators.



Advantages



- They do not need fuel to run them
- They do not make any pollution
- They are cheap to run
- They are reliable
- Dams/tidal barrages can also be used as bridges



Disadvantages



- Set up costs are expensive
- Dams and lakes destroy homes and wildlife
- Building costs are high
- Mud builds up behind dams, making them less efficient.

Did you Know ?

Each person uses about 150 litres of water every day. About 60 litres of this is for toilet flushing.

Water covers nearly three-quarters of the earth's surface.

INFORMATION SHEET

Biomass Energy

The term 'biomass' can be applied to any living matter which can be turned into fuel: wood and plant material.

Biomass is a renewable, low carbon fuel that is already widely used throughout the UK. The biofuel is widely available and environmentally friendly. If managed correctly biomass is a sustainable fuel.

Landfill

When rubbish is buried in a landfill site it decays producing a natural gas called methane. This gas is extracted through pipes then used as fuel. Extracting the methane also reduces the risk of accidental explosions which can occur if the methane is not allowed to escape.

In some countries animal dung is collected and burnt to give off heat which is used for warmth and to cook with.



Advantages



It's a renewable energy source and will never run out.



It does not cause pollution.

Disadvantages



Wood takes up space and makes smoke and ash when burnt.



Wood is more difficult to burn than fossil fuels.



Forests are damaged if new trees are not replanted.

Methane if not released can cause major explosions.

INFORMATION SHEET

Queen Elizabeth Country Park Wood Fuel Burner

Climate change is a reality and using woodfuel will help reduce our reliance on burning fossil fuels which contributes to the process of global warming.



If correctly managed our forests can be a sustainable resource. Here at Queen Elizabeth Country Park we have installed a wood fuel boiler which successfully heats the visitor centre, offices and cafe.

Did you know?

The boiler at Queen Elizabeth Country Park will use 80 tonnes of wood this winter to keep the main facilities warm.



99% of the wood will be burnt leaving 1% of volume as ash

In terms of CO2 reductions, at Queen Elizabeth Country Park a number of small-scale programmes have been implemented such a low energy lighting, switch-off campaigns and improved maintenance programmes.

In managing the environmental impacts of it's operations and visitors, Queen Elizabeth Country Park has a series of measures to reduce emissions, manage waste and conserve biodiversity.

Action Zone

Q. What else could Queen Elizabeth Country Park do to save energy and be environmentally friendly?

INFORMATION SHEET

Organic Farming



Organic farming produces food through a system of farming which minimises damage to the environment and wildlife.

Soil

Organic farmers aim for healthy soils that have a variety of bacteria, mini-beasts and other organisms living within them. Mini beasts, such as worms, contribute to making the soil fertile. It is very important to have all these factors within the soil as they provide the essential nutrients that plants need to grow.

Healthy Soil = Healthy Food = Healthy People

Fertility

To increase the fertility of the soil, organic farmers grow clover which increases the nitrogen levels in the soil, nitrogen is needed by plants to grow. The farmers also spread composted farm manure over the soil to increase its fertility.

Rotations

It is very important for organic farmers to rotate livestock and crops. Rotation means changing the types of crops and animals in a field each year. Rotating the crops and livestock helps control weeds, diseases and pests which can build up if the same crop is planted year after year. It also helps keep the soil fertile.

Environment

Organic farming is not as damaging to the environment. This is due to the fact that it uses fewer chemicals which means less pollution in the soil, rivers and food chains. Organic farming does not permit Genetically Modified (GM) crops or animal feed within its practice.



INFORMATION SHEET

Organic Farming

Wildlife

Studies have shown that fields that have been organically farmed for some time have attracted an increased amount of wildlife such as birds, butterflies and plants. Certain wildlife species such as bats, can help the farmers by controlling pest attacks on crops.

Animals

Livestock which is farmed organically is kept to high standards. The animals can roam freely outside and are given plenty of space to behave in a natural way. Animals are also fed a more natural diet.

Standards

Strict rules must be adhered to gain organic status these rules are called organic standards and they cover all aspects of food production including animal welfare and wildlife conservation.

Advantages to Organic Farming



Tastes good rather than looks good.

Is grown without the use of artificial pesticides and fertilisers.



Contains no artificial flavouring, dyes or unnecessary additives.

Treats the animals in a humane way.

Is produced in ways that minimise damage to the environment.

Disadvantages to Organic Farming



Organic farming uses a lot of land

The food produced is often expensive



INFORMATION SHEET

Organic Farming at Queen Elizabeth Country Park

Butser Hill and Hyden Farm have organic status and have since 2001. Currently on Butser Hill we have a flock of 220 Beulah ewes and approx 30 Manx Loghtan sheep.



Queen Elizabeth Country Park is a member of Hampshire Fare – an initiative to support local producers of food, drink and crafts in Hampshire. QECP sells its own organic lamb, wild venison and are in partnership with a local farm to sell a range of locally produced meats.

The park shop also sells a range of sustainable products including: clothing, stationery, gifts and a substantial range of local produce all of which is Hampshire Fare certified.



Did You Know?

Queen Elizabeth Country Park has a number of environmental designations including 528 acres that is a National Nature Reserve.

During 2004/05 1,000m of native hedging was re-planted.



Butser Hill went organic in 2001.

184 hectares of the National Nature Reserve is farmed organically.

A project to restore 100 acres of chalk heath and 30 acres of chalk downland has been implemented.

Queen Elizabeth Forest is accredited under Forest Stewardship Scheme for its sustainable management.

Action Zone

- Q. How could you support local farmers and food producers in your area?
- Q. Who benefits from the production of local organic food?

INFORMATION SHEET

Intensive Farming

Intensive farming aims to maximise profit by increasing the productivity of the land.

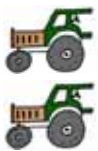
Unfortunately this is done at the cost of the soil, wildlife and the farm animals, as this type of farming uses a large amount of chemical herbicides, fungicides, insecticides, plant growth regulators and other pesticides, to enable it to meet such high demands.



Factory Farming

Factory Farming refers to an intensive form of agriculture that uses extreme growing procedures that enhance animal productivity in a very limited space. For example caged hens, turkeys in barns and cattle kept in cowsheds.

Advantages



During the twentieth century intensive farming produced stable food for a growing population using a little amount of land.

Cheaper food

Disadvantages



The removal of hedges to make larger fields destroys vital habitats for wildlife and can lead to soil erosion.



The use of chemicals on the land can pollute rivers and lakes.

Pesticides destroy the food chain and reduce many insect, bird and mammal populations.



Intensive farming of animals is considered to be cruel.

INFORMATION SHEET

Waste Management

Each year 500 cubic metres of general rubbish is managed on site. This includes food, litter and dog faeces which cannot be recycled. All of this waste will be taken to a landfill site.



Queen Elizabeth Country Park has an extensive recycling programme in place and has managed to recycle 100% of it's paper waste. As a result of being an eco-centre we endeavour to recycle, reuse and reduce all our waste.

We Recycle



Plastic.



Metal Cans.



Compost the cafe's kitchen waste.



All paper we use is either recycled or made from a sustainable sources.



Batteries

Fluorescent light tubes



All cans collected at QECP raise money for the Deadwater Valley Trust who look after community green space in the Whitehill and Bordon area.

Did You Know?

Each year at QECP we recycle over 50 cubic metres of cardboard.



Each Year at QECP over 4 Tonnes of paper are recycled raising money through a local parish scheme for cancer research.



INFORMATION SHEET

We Reduce



Our use of energy by switching off any unnecessary lights



Using low energy light bulbs where possible

To reduce the use of water we have installed push down tops on taps.



Members of staff lift-share or cycle work

We Reuse



Materials for children's art activities



Off- cut Netting



Envelopes and office materials

Plastic materials which are made into benches and table tops



Action Zone

Q. Within your school what do you do to reuse, recycle and reduce?

Q. What else could you do to reduce your waste within your school?

Q. Make a compost heap at home?

Start a recycling campaign within your school?

INFORMATION SHEET

QECP Reed Bed Toilets System

Waste water and sewage from the Juniper Toilets pass through a conventional septic tank where aeration and filtration are used to separate the liquid from the solids



The liquid then flows through two reed beds each of which contains 30 tonnes of gravel.

A combination of the gravel, water plants and micro-organisms remove organic matter, nitrogen and phosphates, leaving the water clean enough to be discharged straight into the ground.



The reed beds also create an excellent wildlife habitat, supporting a variety of insect and plant life.

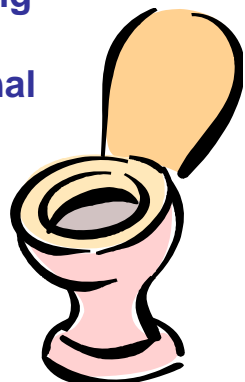
Did you Know?

The timber cladding and structural beams for Juniper Toilet block come from Red Cedar and Douglas Fir grown locally by the Forestry Commission.



50 cubic metres of pea shingle helps filter the waste from 80,000 people who use the Juniper toilets each year

The Wallgate hand washing units save 75% of water compared to a conventional basin system.



Action Zone

How could you save water within your school?

How can toilets be more environmentally friendly?

Further Information

Queen Elizabeth Country Park - www.hants.gov.uk/gecp

The Ernest Cook Trust - www.ernestcooktrust.org.uk

Organic Farming

The Soil Association - www.thesoilassociation.org

Hampshire Fare - www.hampshirefare.co.uk

Intensive Farming

Compassion in World Farming - www.ciwf.org

Recycling

Recycle for Hampshire - recycleforhampshire.org.uk

Woodfuel

The forestry Commission - www.forestry.gov.uk

For Further information on educational activities at Queen Elizabeth Country Park please contact the Education Officer.

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