

# Teachers Notes

## Links to new revised Curriculum in Northern Ireland

### Learning Areas:

Material created for Key Stage 1 and Key Stage 2 is linked closely to the new revised curriculum for Primary schools in Northern Ireland. It can be incorporated into the learning area *The World Around Us* as well as learning areas, *Language and Literacy* and *Personal Development*.

### Curriculum Objectives:

To develop the young person as a contributor to the economy and environment: education for sustainable development.

To develop the young person as a contributor to society: media awareness, citizenship.

To develop the young person as an individual: Personal Development.

### Whole Curriculum Skills and Capabilities:

ICT and Communication  
Using Mathematics  
Being Creative  
Working with others  
Managing information  
Thinking, problem solving and decision making  
Self-management

### Learning Experiences:

Media-rich  
Investigating and problem solving  
Links between curriculum areas

Relevant and enjoyable  
Challenging and Engaging  
Positive reinforcement

### Attitudes and Dispositions:

Personal responsibility  
Commitment – determination – resourcefulness  
Openness to new ideas  
Curiosity

## Lesson Plans: Key Stage 1

### Lesson 1: What is energy?

#### Learning Objectives:

Pupils understand that energy provides them with heat and electricity.

#### Structure:

Information sheet: Read and discuss information on energy.

Activity Sheet: Encourage pupils to think of what they use electricity for at home and in school. They may draw pictures of a computer, television, CD or DVD players, fridge, oven or lights.



## Lesson 2: What is non-renewable energy?

### Learning Objectives:

Pupils understand that coal, oil and gas are burned in Power Stations to provide us with electricity.

Pupils are aware that coal, oil and gas are non-renewable; they will eventually run out.

### Structure:

Information sheet: Read and discuss information on non-renewable energy.

Activity Sheet: Activity to unscramble the message. The message reads *Coal, oil and gas are non-renewable*.

Encourage pupils to discuss what electrical appliances they would miss if electricity ran out. Use the box to write down their five most missed appliances.

## Lesson 3: How does burning coal, oil and gas cause pollution

### Learning Objectives:

Pupils are aware that pollution makes the air dirty and can affect plants, animals and humans.

Pupils understand that burning coal, oil and gas leads to pollution.

### Structure:

Information Sheet: Read and discuss information on pollution.

Activity Sheet: Activity using picture of a Power Station.

### Answers -

How many trees can you count? 6

How many chimneys can you count? 7

Do you think the smoke that is coming from the chimneys is good for the trees?

No

### Why?

*Pupils should mention the fact that the smoke comes from burning coal, oil or gas which causes pollution. Pollution makes the air dirty which is bad for the trees.*

Activity to unscramble the letters to encourage pupils to think about where else pollution can come from.

**Answers:**

racs	cars
ousshe	houses
esbus	buses
penrolaesa	aeroplanes
hpssi	ships
kcturs	trucks

## Lesson 4: What is global warming?

### Learning Objectives:

Pupils are aware that burning fuels such as coal, oil and gas releases carbon dioxide into the atmosphere which leads to global warming.

Pupils are aware of the global effects of global warming.

### Structure:

Information Sheet: Read and discuss information on global warming.

Activity Sheet: Pupils should work on their own to score out the word that is incorrect.



- Answers**
- The Earth is slowly becoming **warmer**.
  - When coal, oil and gas are burned, a gas called **carbon dioxide** is released into the air.
  - Today, people are burning **more** fuels like coal, oil and gas.
  - This is leading to global **warming** which is already causing problems.

Pupils should be encouraged to work with a partner to write a brief, attractive newspaper report on global warming.

They should use the information they have already discussed as a class. Encourage pupils to share their report with the rest of the class.

## Lesson 5: What is renewable-energy?

### Learning Objectives:

Pupils understand that renewable energy is energy that will never run out and will not damage the earth.

Pupils are aware of examples of where renewable energy comes from.

### Structure:

Information Sheet: Read and discuss information on renewable energy.

Activity Sheet: Get pupils to complete sentences-

*Non-Renewable energy is energy that will eventually run out.*

*Renewable energy is energy that can be used over and over again.*

Pupils should complete the word search.

### Answers:

```

D + + + + + + + + +
+ N + + + + + + + +
A + I + + + + + + P
+ N + WW + + + + L
+ + I A + S + + + A
+ + T M A + + + + N
+ E L G A + + + + T
R + I + + L A O C S
+ + O S U N S + + +
+ + + + + + + + +
    
```

### (Over,Down,Direction)

- ANIMALS(1,3,SE)
- COAL(9,8,W)
- GAS(4,7,NE)
- OIL(3,9,N)
- PLANTS(10,3,S)
- SUN(4,9,E)
- WATER(5,4,SW)
- WIND(4,4,NW)

Pupils should then place the words under the correct heading:

Non-renewable energy	Renewable energy
Coal	Animals
Oil	Plants
Gas	Sun
	Water
	Wind



### Lesson 6: How can energy come from the wind?

**Lesson Objectives:**

Pupils are aware that wind energy is renewable.

Pupils understand the wind can be used to power buildings.

Pupils are aware of the basic structure of a wind turbine.

Pupils understand that wind farms are a collection of wind turbines together.

**Structure:**

Information Sheet: Read and discuss information on wind energy.

Activity Sheet: Pupils should colour in the picture of wind turbines.

There are 3 wind turbines in the second picture. Pupils should be encouraged to draw a fourth wind turbine.

Pupils should complete the maze to help them understand that the wind makes wind turbines work.

Pupils can make their own pin wheel. They will need the teacher to guide them through this exercise. You need enough of the following for the size of your class:

- Drinking straws
- Hole punch
- Paper fasteners
- Paper and scissors

### Lesson 7: How can energy come from the sun?

**Lesson Objectives:**

Pupils are aware that solar energy is renewable.

Pupils understand that solar energy is energy (light or heat) that comes from the sun.

Pupils are aware that the sun can provide us with heat and electricity.

**Structure:**

Information Sheet: Read and discuss information on solar energy.

Activity Sheet: Pupils should complete the word search on solar energy.

**Answers:**

```

C O M P U T E R + + + C
+ + + + + + + + + + + A
+ + + + + + + + + + + L
S L E N A P R A L O S C
E L E C T R I C I T Y U
+ N U S + + + + H L + L
E L B A W E N E R I + A
+ + + + + + A + + G + T
+ + + + + T + + + H + O
+ + + + + + + + + + T + R
    
```

**(Over,Down,Direction)**

- CALCULATOR(12,1,S)
- COMPUTER(1,1,E)
- ELECTRICITY(1,5,E)
- HEAT(9,6,SW)
- LIGHT(10,6,S)
- RENEWABLE(9,7,W)
- SOLARPANELS(11,4,W)
- SUN(4,6,W)

Pupils should then use the words they found to complete the following sentences:

Solar energy simply means energy (*light and heat*) that comes from the *sun*.

Solar energy gives light which can help to make *electricity* for our houses, schools and other buildings.

Electricity from solar panels runs along cables and we can use it to power a TV, a radio, a light or a *computer*.

A *calculator* can use solar energy to power it instead of batteries. The sun's energy will not run out so it is *renewable*.

In order to get energy from the sun, *solar panels* are put on the roof of a building.

## Lesson 8: How can energy come from water?

### Lesson Objectives:

Pupils are aware that water energy is renewable.

Pupils are aware that water has been used traditionally to produce power and is still used today.

Pupils understand how electricity can be produced from building dams.

### Structure:

Information Sheet: Read and discuss information sheet on water energy.

Activity Sheet: Encourage pupils to colour in the picture of a traditional waterwheel.

Pupils should complete the crossword on water energy.

### Answers –

#### Across

- A *marine* turbine works like a wind turbine but it uses tides in the sea to turn the blades round.
- This type of energy will never run out: *renewable*.

#### Down

- A large concrete wall that can hold water back: *dam*.
- Inside the pipes the water turns machines called turbines which are connected to *generators*.
- The name of the lake that is formed behind the dam: *reservoir*.

## Lesson 9: How can energy come from plants and animals?

### Lesson Objectives:

Pupils are aware that biomass energy is renewable.

Pupils are aware that biomass energy means energy from plants and animals.

Pupils understand that biomass energy can provide us with heat, electricity and fuel for vehicles.

### Structure:

Information Sheet: Read and discuss information on biomass energy.

Activity Sheet: Get pupils to fill in the blanks using the words below the paragraph.

**Answers:**

Plants like grass and *willow* trees, and rubbish from forestry, *farming* and homes can be used to heat houses and make *electricity* in Power Stations.

Rubbish from houses and work places sometimes gets put into big holes in the ground called *landfill*. The rubbish rots away and makes a smelly gas called *methane*. This gas can be used to heat homes. Animal *manure* can also be used as energy!

Encourage pupils to make a colourful, attractive poster to advertise biomass energy. They should include a heading, a picture and some information.

## Lesson 10: What can you do to save energy??

**Lesson Objectives:**

Pupils are aware of ways in which they can save energy today.

**Structure:**

Information Sheet: Read and discuss information on saving energy.

Activity Sheet: Encourage a class discussion to think of other ways they could save energy. For example, they might turn a CD player off when they are not listening to it or only put a dishwasher on when it is full.

Pupils should be put into groups of 3 or 4 and provided with colouring pencils/ felt tips/ paints and paper to create a colourful poster to encourage others to save energy

## Lesson Plans: Key Stage 2

### Lesson 1: What is energy?

**Learning Objectives:**

Pupils understand that energy provides them with heat and electricity.

**Structure:**

Information sheet: Read and discuss information on energy.

Activity Sheet: Encourage pupils to think of what they use electricity for at home and in school. They will write a diary extract to help them think about everything they use electricity for in a typical day, for example, lights, alarm clock, oven, computers and television.

### Lesson 2: What is non-renewable energy?

**Learning Objectives:**

Pupils understand that coal, oil and gas are burned in Power Stations to provide us with electricity.

Pupils are aware that coal, oil and gas are fossil fuels.

Pupils understand that fossil fuels are non-renewable; they will eventually run out.

**Structure:**

Information Sheet: Read and discuss information on Non-renewable energy.

Activity Sheet: Get pupils to unscramble the sentence and write the answers below.

**Answers –**

electricity oil used power stations gas to make coal and are in *coal, oil and gas are used to make electricity in power stations*

fossil fuels known coal as oil and gas are *coal, oil and gas are known as fossil fuels*

wires electricity home reaches your along *electricity reaches your home along wires*

coal are non-renewable gas and oil *coal, oil and gas are non-renewable*

energy run out that eventually non-renewable is energy will *non-renewable energy is energy that will eventually run out*

Pupils will then write sentences to explain where coal, oil and gas come from. For example –

*Coal is found under the ground. It is made from trees and plants which were alive millions of years ago. It is taken out of the ground from coal mines.*

*Oil and gas are formed under the sea. They are made of tiny sea creatures and plants which have sunk to the bottom of the sea and begun to rot away. The rotting material turns into a dark liquid, forming a layer of gas on top of the oil.*

Finally, try to encourage pupils to think about how they would feel if they didn't have electricity. They will draw the appliances they would miss the most into the box.

**Lesson 3:  
How does burning fossil fuels cause pollution?**

**Learning Objectives:**

Pupils understand that burning fossil fuels

leads to pollution.

Pupils are aware that pollution makes the air dirty.

Pupils understand the effects of carbon dioxide in the atmosphere.

**Structure:**

Information Sheet: Read and discuss information on pollution.

Activity Sheet: Get pupils to complete the word search on pollution.

**Answers –**

**P O L L U T I O N + + + L + + E + +**  
**+ + + + + + + + + + + + + L S + + +**  
**E D I X O I D N O B R A C I E + + +**  
**+ + + + + + + F S + S O + + M + +**  
**+ + + + + F S + + A L N R + + + S +**  
**+ + + + + O + A + + C A + A + + + +**  
**+ + + + + S + + G + + T M + C + + L**  
**+ + + + + S + + + + + A O I + + + U**  
**+ + + + + I + + + + M + + R N + + F**  
**+ + + + + L + + + H + + + + I A + M**  
**S + + + + F + + T + + + + + E + R**  
**+ E + + + U + S + + + + + + + S A**  
**+ + S + + E A L A O C + + + + + H**  
**+ + + U S L + + + + + + + + + +**  
**+ + + E O S + + + + + S T N A L P +**  
**+ + S + + H L I O + + + + + + + +**  
**+ U + + + + + + + + + + + + +**  
**B + + + + + + + + + + + + + +**

**(Over,Down,Direction)**

- ANIMALS(16,10,NW)
- ASTHMA(7,13,NE)
- BUSES(1,18,NE)
- CARBONDIOXIDE(13,3,W)
- CARS(15,7,NW)
- COAL(11,13,W)
- FACTORIES(9,4,SE)
- FOSSILFUELS(6,5,S)

GAS(9,7,NW)  
 HARMFUL(18,13,N)  
 HOUSES(6,16,NW)  
 NOISE(12,5,NE)  
 OIL(9,16,W)  
 PLANTS(17,15,W)  
 POLLUTION(1,1,E)  
 SMELL(17,5,NW)

Pupils should then attempt to use the words from the word search- to explain how burning fossil fuels leads to pollution.

## Lesson 4: What is global warming?

### Learning Objectives:

Pupils are aware that burning more fossil fuels leads to an increase in carbon dioxide in the atmosphere.

Pupils understand the link between a higher concentration of carbon dioxide in the atmosphere and global warming.  
 Pupils learn the effects of global warming.

### Structure:

Information Sheet: Read and discuss information on global warming.

Activity Sheet: Pupils should try to unscramble the hidden message which reads: *Global warming means the Earth is getting warmer.*

Pupils should then fill in the missing words in the paragraph:

Gases in the air like *carbon dioxide* keep the planet warm which is needed for the *earth* to survive. The problem is that people are burning more and more *fossil fuels* which means there is more *pollution* and too much carbon dioxide in the air.

This means the world is getting *warmer*.

Even a little extra warming may have disastrous effects on *earth*.

Read all the information about the causes and effects of global warming. Renewable Robbie discovered that there are a lot of problems all around the world because of global warming. The ice at the north and south poles is starting to melt, in wet countries there will be more flooding, while hot and dry countries will become even hotter and drier.

The next exercise involves working in groups. Put the class into groups of five. Their task is to write a news report on global warming explaining the causes and effects. If it is possible, they could do some research on the internet. Pupils will chose two of them to be news readers. The others will either be a fisherman from Alaska, a rice farmer from Bangladesh or a farmer from the Sudan. The two news readers need to decide what to say about global warming and think of a way to interview the other three people. Each character needs to think of what to say about how global warming will affect them. The news report should be about 5 minutes long. Pupils should be encouraged to present their report to the rest of the class.

## Lesson 5: What is renewable energy?

### Learning Objectives:

Pupils understand that renewable energy is energy that will never run out and will not damage the earth.

Pupils are aware of sources of renewable energy.

**Structure:**

Information Sheet: Read and discuss information on renewable energy.

Activity Sheet: Pupils should work out the cryptogram which reads *renewable energy is energy that can be used over and over again.*

Pupils should familiarise themselves with the sources of renewable energy by finding the words in the word search.

**Answers –**

**R + + + + L A M R E H T O E G**  
**A + + + + + E + + + + +**  
**L + + + + + T S + + + + +**  
**O + + + + A + + S + + + + +**  
**S + + + W + + + + A + + + + +**  
**+ + + + + + + + + M + + + +**  
**+ + + + + + + + + + O + + +**  
**+ + + + + + + + + + I + +**  
**+ + + + + + + + + + B +**  
**+ + + + + + + W I N D + + + +**

**(Over,Down,Direction)**

- BIOMASS(14,9,NW)
- GEOHERMAL(15,1,W)
- SOLAR(1,5,N)
- WATER(5,5,NE)
- WIND(8,10,E)

**Lesson 6:**  
**How can energy come from the wind?**

**Lesson Objectives:**

Pupils are aware that wind energy is renewable.

Pupils understand the wind can be used to power buildings.

Pupils understand how a wind turbine

works and the structure of a wind turbine.

Pupils understand that wind farms are a collection of wind turbines together.

Pupils are aware of advantages and possible disadvantages associated with wind energy.

**Structure:**

Information Sheet: Read and discuss information on wind energy.

Activity Sheet: Pupils should circle the correct answer in the sentences.

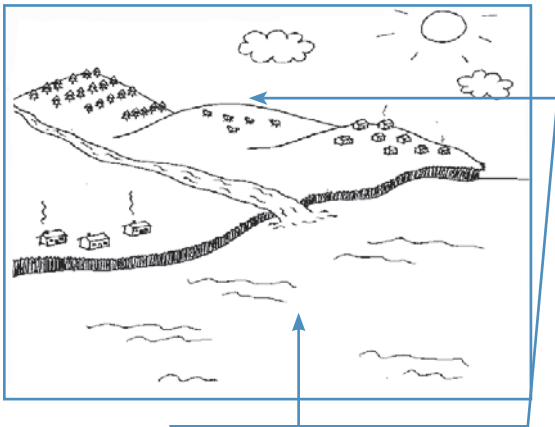
**Answers –**

1. Wind turbines are built in **exposed** locations.
2. The best location is on **top of a mountain.**
3. Wind turbines are enormous and need **a lot of space.**
4. Wind energy is a **renewable** source of energy.

Pupils will need to be guided through the instructions to make their own windmill. The following equipment is needed for each pupil:

- Card*
- A pipecleaner*
- A straw*
- A pair of scissors*

The decision making activity involves the pupils deciding where the best place is to locate a wind farm. This could be carried out as a whole class activity.



The best locations would either be on top of the second hill or off shore as they need to be in exposed areas away from buildings and trees.

Pupils will be encouraged to carry out a debate on wind farms. The motion states that **THIS HOUSE BELIEVES THAT WE SHOULD BUILD MANY MORE WIND FARMS**. You will split the class into two groups; one group will be for and one against wind farms. If possible, pupils could do some extra research on the internet to come up with more arguments. As a teacher, you will chair the debate. Let each group share their argument and then carry out a vote.

## Lesson 7: How can energy come from the sun

### Lesson Objectives:

Pupils are aware that solar energy is renewable.

Pupils understand that solar energy is energy (light or heat) that comes from the sun.

Pupils are aware that the sun can provide us with heat and electricity.

Pupils understand the three different ways in which the sun can be trapped and used: passive, active and PV.

Pupils are aware of the advantages and possible disadvantages of solar energy.

### Structure:

Information Sheet: Read and discuss information on solar energy.

Activity Sheet: Pupils will complete the cross word on solar power.

### Answers:

#### Across

2. The closest star to the earth: *sun*
7. These cells allow sunlight to be changed into electricity: *photovoltaic*
8. The outside of the solar collector is *clear* which allows the sun's rays to pass through easily
9. The bottom of the solar collector is painted this colour: *black*
10. *Passive* solar heating attracts the sun through glass

#### Down

1. Small PV cells can power these: *calculator*
3. This type of solar heating needs a solar collector fitted to the roof of a building: *active*
4. In a solar collector, the pipes are filled with *water*
5. A thin flat box that attracts the sun's rays: *solar collector*
6. This type of energy means light or heat that comes from the sun: *solar*

The solar heating experiment requires the following equipment:

*Different sizes of aluminium containers (deep, shallow, wide)*

Black paint  
Measuring jug  
Water  
Cling film  
Newspapers  
Thermometer

Pupils will need to be guided through the instructions with the aid of the teacher.

## Lesson 8: How can energy come from water

### Lesson Objectives:

Pupils are aware that water energy is renewable.

Pupils are aware that water has been used traditionally to produce power and is still used today.

Pupils understand the process of gaining electricity from building dams.

Pupils are aware of tidal barrages and marine turbines.

Pupils understand the advantages and possible disadvantages associated with water energy.

### Structure:

Information Sheet: Read and discuss information sheet on water energy.

Activity Sheet: Pupils can attempt to make their own waterwheel. They will need guidance from the teacher and the following equipment:

Two pieces of cardboard  
Scissors  
Bright crayon / felt tip / pen  
Egg carton  
Stapler  
Pencil  
String

Egg cup  
Access to a water tap

Pupils will explain how the water wheel works in their own words. For example, *The water wheel is circular in shape and has been made stronger by putting egg cups in between the two pieces of card. A pencil has been placed through the centre of the wheel which will cause it to spin when running water is poured over it.*

Pupils are asked to think of ways in which they could improve the design. For example, *they may decide plastic would be better to use than cardboard as cardboard can get soggy when water is poured on it.*

Pupils will then place sentences in the correct order to explain how electricity is produced by building dams.

### Answer –

- The dam blocks a river which is flowing through a valley.
- The blockage causes the river to flood the valley which creates a **reservoir**. A reservoir looks like a lake.
- Large **pipes** in the dam forces the water to flow through under pressure.
- The water turns the **turbines** inside the pipes. The turbines are connected to generators.
- The generators spin round to produce **electricity**.
- The water from the pipes flows away down the river.

Pupils will then make up an article for a newspaper to explain the benefits of water energy. Pupils should use the information they have discussed to help them. If possible, extra research on the internet would be beneficial. Their articles

should include a heading, a picture and text.

## Lesson 9: How can energy come from biomass?

### Lesson Objectives:

Pupils are aware that biomass energy is renewable.

Pupils are aware that biomass energy simply means energy from plants and animals.

Pupils understand that biomass energy can provide us with heat, electricity and fuel for vehicles.

Pupils are aware of how landfill gas can provide us with energy.

Pupils understand how wood chips can give us energy.

Pupils are aware of advantages and possible disadvantages associated with biomass energy.

### Structure:

Information Sheet: Read and discuss information about biomass energy

Activity Sheet: Get pupils to underline the correct answers from the questions below. Answers –

**1. Name three different uses for biomass energy**

*Heating homes*

*Fuel for vehicles*

*Gas for cooking*

**2. Why is willow an ideal biomass crop?**

*It grows quickly*

**3. What is the gas that is produced when plants and animal material in waste decays?**

*Methane*

**4. Where are wood chips burnt?**

*In a boiler*

Pupils will then make up a poster advert to try to convince the public to think about using biomass energy instead of oil or gas. It would be advised to concentrate on wood for this activity. Try to get pupils to make the adverts colourful with pictures and information. They may want to list the disadvantages of using coal, oil and gas and then the advantages of using biomass energy.

## Lesson 10: How can energy come from the ground

### Lesson Objectives:

Pupils are aware that geothermal energy is renewable.

Pupils understand that energy from the ground can provide heat and electricity.

Pupils are aware of the ways in which energy can be obtained from the ground.

Pupils are aware of the process involved in a geothermal power plant.

Pupils understand the advantages and possible disadvantages associated with geothermal energy.

### Structure:

Information Sheet: Read and discuss information on geothermal energy.

Activity Sheet: Pupils should put a circle around the correct answer.

**Answers –**

- Geothermal energy is **renewable**
- Geothermal energy comes from deep inside the **earth**
- Geysers are powerful **hot** springs
- Geothermal energy **can** be used to produce electricity

Pupils will then place sentences in the correct order to explain the process that takes place at a geothermal Power Station.

**Answer –**

Two holes are drilled into the earth to reach hot rocks or a hot underground lake

Cold water is pumped underground and heated by rocks or lake

Hot water is pumped up to the Power Station at the surface

The steam turns a machine called a generator which makes electricity

Pupils will identify geothermal hot spots:

**Lesson 11:**  
**How can energy come from the ground**

**Lesson Objectives:**

Pupils are aware of ways in which they can save energy today.

**Structure:**

Information Sheet: Read and discuss information on saving energy.

Activity Sheet: Encourage a class discussion to think of other ways they could save energy. For example, they might turn a CD player off when they are not listening to it or turn off a mobile phone when it is not needed to save energy charging it.

Pupils should then be put into groups of 3 or 4 and provided with colouring pencils/ felt tip/ paints and paper to create a colourful poster to encourage others to save energy.

**North America**

**Iceland**

**Italy**

**New Zealand**

