

Scouts Resource Pack



Introduction from Utility Regulator

Today's young people are the citizens of tomorrow. Families, communities and schools invest their time in preparing young people for their adult lives.

The Scout Association plays a valuable role in its work with young people. It provides a supportive, creative and educational environment for young people to develop and grow as individuals.

I am delighted that the Scout Association, along with a range of utility companies, have agreed to participate in a pilot programme of activities aimed at promoting awareness and understanding of issues such as energy efficiency, water conservation and energy health and safety.

The programme of activities outlined provides an opportunity for young people to reflect on the electricity, gas and water that we take for granted. At the end of the pilot programme I hope the young people will be able think in a new and informed way about our utility services.

I thank the young people for taking part, and am also grateful for the support of the Scout Association and the utility companies involved, NIE, NI Water, Phoenix Natural Gas and Power NI.

Peter Matthews
Chairman, Utility Regulator

Introduction from NI Scout Council

Scouting in Belfast is grateful for the opportunity to work with the Utility Regulator and the various utilities on this exciting pilot project. It will help our young people to be more aware of the impact of gas, water and electricity on all of our lives.

Scouting began in Belfast over a hundred years ago. At that time business was buzzing in the city and a high level of Edwardian civic engagement was very evident. This civic and business support provided a solid foundation for an innovative youth movement; but getting scouting off to a great start required the unselfish commitment of individuals in many other organisations including churches, the YMCA and – perhaps surprisingly - The Boys Brigade.

Belfast's ability to support the new scouting movement in those days owed much to the profits made by the city's coal gas works. It is therefore particularly appropriate that this further development of scouting in Belfast is being supported by the Utility Regulator and the various utilities operating in the city; gas, water and electricity. A big thank you to everyone concerned in developing this unique pilot project which we hope will be welcomed more widely by scouting across Northern Ireland and eventually to be launched nationwide among scouting in the rest of the UK.

Derek Wheeler

County Commissioner, Belfast
NI Scout Council



Scout Leader Information

Welcome to this pilot project. We hope you and your young people will enjoy participating in it and that between us we will learn enough from the project to help us roll it out across NI and eventually offer it to the Association across the UK.

The games and activities set out in this pack are suggestions rather than rigid requirements. Our intention is that your young people should participate in a range of activities that will help them to get to know about key aspects of the utilities in Northern Ireland. We will develop an appropriate badge for your young people to wear to mark their participation in the project but you may also want to align the project elements with the mainstream Challenges and Awards in your section. Your Balanced Programme Checker should help you with this alignment.

Please feel free to adapt the suggested elements to suit your own situation, but please ensure you carry out at least one activity from each section. We would particularly welcome news of any adaptations you make so that they can be included in the future. It is also open to you to adapt your own favourite games and activities to get across key concepts to your young people. For example a game like "Man Overboard" can be changed to incorporate terms used by the utilities.

It is of course everyone's responsibility to spot any hazards associated with the suggested activities and leaders should conduct simple risk assessments to spot potential hazards and how to reduce or eliminate them.

It would be helpful to see any notes you keep during the project and we would appreciate your feedback using the form at the back of this resource pack.

We hope to keep in touch with you during the project but if you would like more help or advice please do not hesitate to get in touch.

Best wishes!

Electricity



Activity E1:**Game: Electricity,****Gas, Water****Instructions:**

- Cub scouts sit in a large circle, with a Leader standing in the centre.
- The leader throws a beanbag to the first cub and calls out either 'Gas' 'Electricity' 'Water'
- The Cub Scout tries to catch the bean bag and reply with a connected word with the element. For example:
 - Gas – cooking
 - Electricity – lights
 - Water – swimming

Equipment:

Bean Bags

Suggested duration:

From 15mins to 20mins

Additional information:

You might start with the young people standing, and if they drop the bean bag, or can't think of a word, they go down on one knee etc.

Activity E2:**Energy Treasure Hunt****Instructions:**

- Hide the pictures around a play area
- Cubs sit in a circle in the middle of the room
- Explain that there are several kinds of renewable energy and how they are important to help reduce climate change
- Show the Cubs the pictures of different types of renewable energy taped to the walls
- Name one particular type of energy
- On 'Go', Cubs run to find the pictures of the particular type of energy that you mentioned.
- Once the Cubs have found these pictures, they bring them back to the circle. Everyone else should also return to the circle. Discuss the type of energy and how it works. Repeat the process with another type of energy until they have all been found and discussed.
- Once a Cub has found a picture they can only help others to find the next picture.

Equipment:

Pictures of four basic types of renewable energy from magazines or the internet. As many pictures as there are Cubs.

Suggested Duration:

From 5 to 20 minutes

Additional Information:

Renewable resources are resources that can be grown in a short amount of time or are naturally occurring energy resources in the universe. Some of these naturally occurring energy resources are from water (hydro-electric, tidal energy), the sun (solar heating and photovoltaic), wind (wind turbines and wave power), the heat from the core of the earth (geothermal energy) and organic matter such as trees and wheat (bio-mass and ethanol).

Activity E3:**Energy Audit** (in the scout hall)**Instructions:**

- Explain to the young people that fuel bills in the meeting place are expensive. Their task is to carry out an energy audit to identify ways in which energy consumption can be reduced.
- Scouts should work in small groups to carry out the audit.
- Spend 15 minutes at the end reporting back on findings

Equipment:

Pens
White paper

Suggested Duration:

Approximately 45 minutes

Additional Information:

As well as identifying the energy wastage, encourage the young people to identify ways in which energy consumption could be reduced (particularly the most cost effective method).

Activity E4:**Energy Audit (at home)****Instructions:**

- Explain to the young people that fuel bills in the home are expensive. Their task is to carry out an energy audit in their home and to identify ways in which energy consumption can be reduced. They are to bring their results back to the scout group.
- Some adult help may be required for information to complete this task.

Equipment:

Access to:
<http://www.powerni.co.uk/index.php/saving-energy/online-home-energy-check/>

Suggested Duration:

From 20 minutes

Additional Information:

Power NI's Home Energy Check allows you to understand your home's energy efficiency performance, helping you reduce your energy consumption and save money.

After filling in the online form, Power NI will then work out the home's current energy efficiency rating and provide you with personalised suggestions about how to reduce your energy bills.

Activity E5:**Solar Energy****Instructions:**

- Wrap the paper around one of the glasses using an elastic band or tape to hold it on
- Do the same with the black paper and the other glass
- Fill the glasses with exactly the same amount of water
- Leave the glasses out in the sun for a couple of hours before returning to measure the temperature of the water in each

Equipment:

Two identical drinking glasses or jars
Water
Thermometer
Two elastic bands or some sticky tape
White paper
Black paper

Suggested Duration: 2 hours in total

Additional Information:

Activity E6:

Making a Solar Panel

Instructions:

- Use two pieces of aluminium sheeting sized 20cm by 20cm
- Paint one black
- Tape a plastic bag or folder on one side of each sheet
- Fill each bag with 100ml water and place a thermometer in each bag
- Place the sheets at an appropriate angle in direct sunlight
- Measure the temperature every 30 seconds for 10 minutes
- Note the results in an appropriate graph and assess the results
- Discuss the results

Equipment:

2 aluminium sheets approx 20cm x 20cm (kitchen foil is sufficient)
Black matt paint and brush
Plastic folder or bag
Strong tape
Measuring beaker and water
2 thermometers
Watch with a second hand/stop watch

Suggested Duration: 20 mins

Additional Information:

Activity E7:**Build a simple wind turbine****Instructions:**

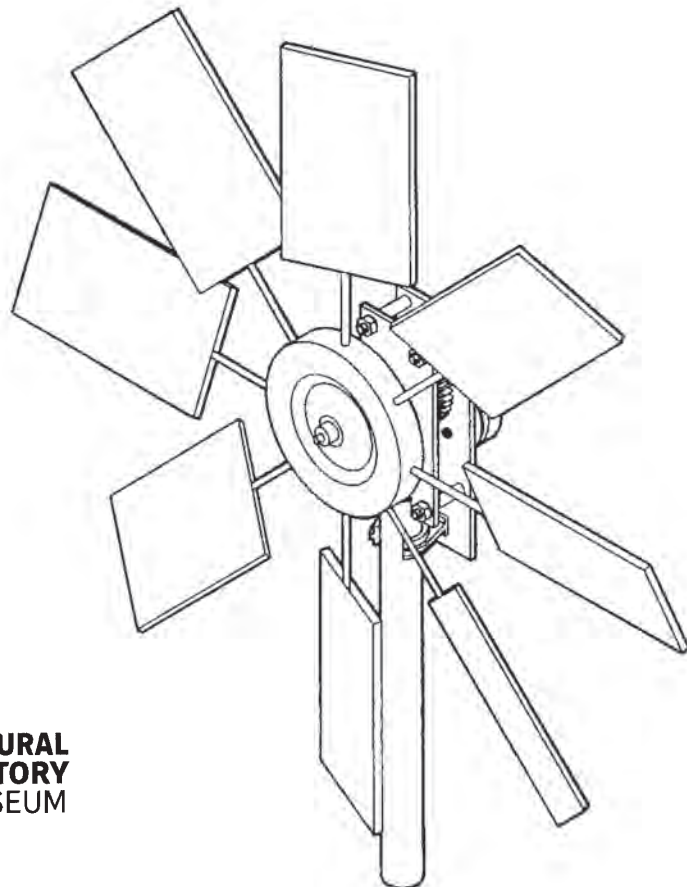
- Look at the pictures and assembly instructions on the following pages

Equipment:

As supplied in pack

Suggested Duration:

20 mins

Additional Information:

Introduction

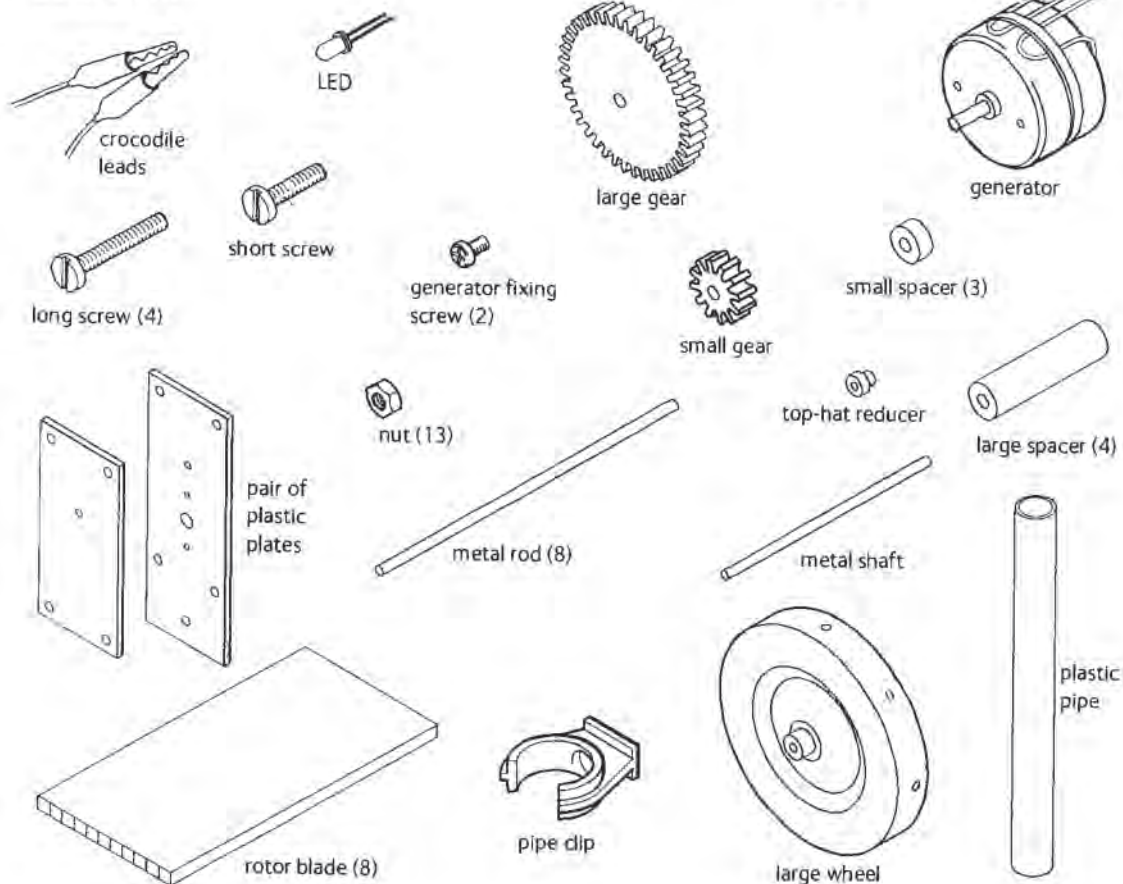
Wind power has long been used to drive machinery. The first windmills were in use hundreds of years ago. More recently, wind-powered turbines have appeared in growing numbers as an environmentally friendly alternative to the use of fossil fuels such as oil and gas.

Your wind-powered turbine works just like a full-size one. As the wind blows through the blades of the rotor it causes the shaft to turn. The shaft is connected via gear wheels to a generator, which produces electricity as it turns. Your generator has a light emitting diode (LED) attached to it, which will light up when electricity is produced.

Note: A generator is a special type of electric motor. When the motor shaft is spun it produces electricity.



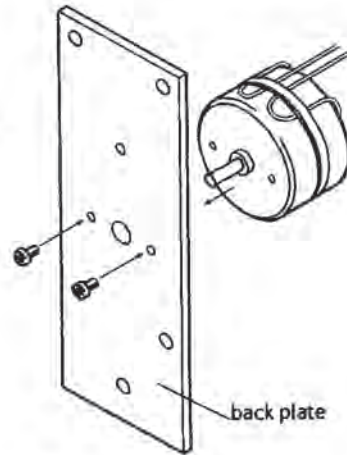
CONTENTS



Making your wind-powered generator

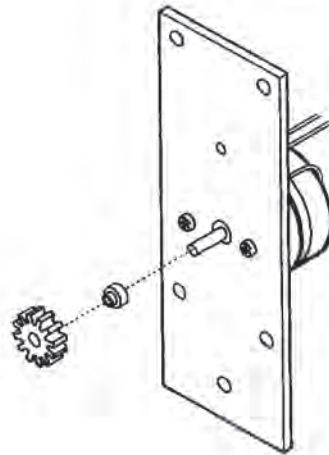
1. Fit the generator to the plastic plate as shown, using the two small screws.

Note: the plates are covered with a protective film. Peel off the film before use.

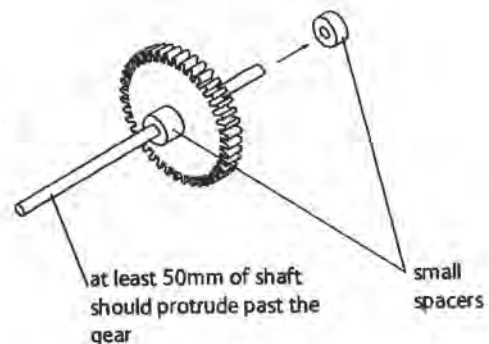


2. Press the top-hat reducer into the small gear wheel (the hole is bevelled on one side to make it easier) then press it onto the spindle of the generator.

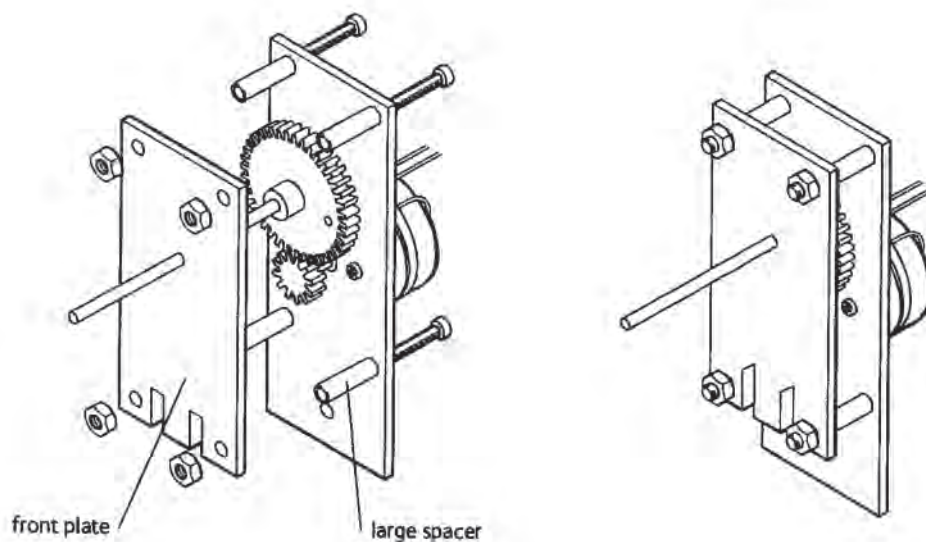
There may be some excess plastic on the gear wheels from the moulding process. Carefully remove this with a craft knife.



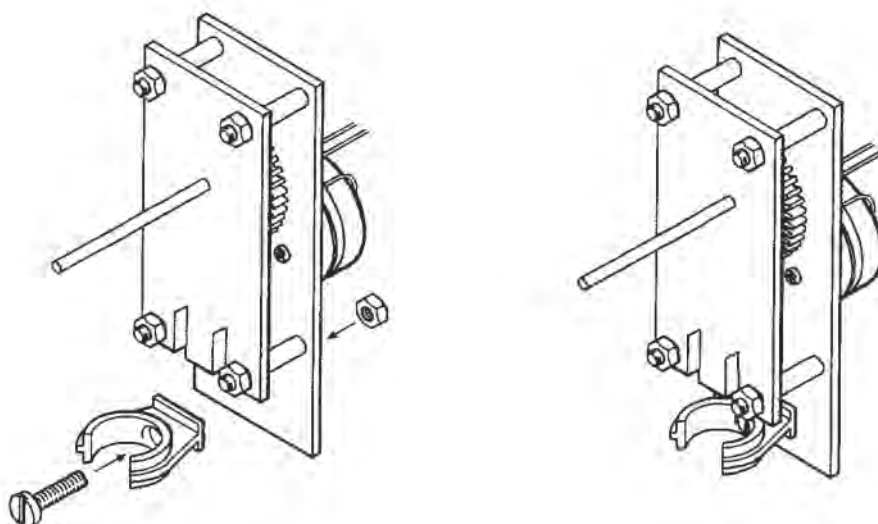
3. Push the large gear onto the metal shaft (the hole in the gear is bevelled on one side to make this easier, but you may need some help with this). Slide the small spacers onto the shaft, then poke the end of the shaft through the hole in the plate above the small gear.



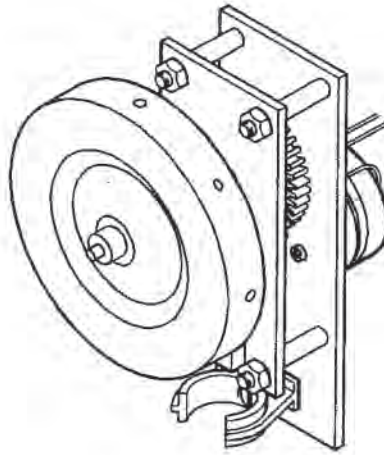
4. Insert the four long screws through the back plate as shown and slide a large spacer over each screw. Slide the front plate over the shaft and tighten a nut onto each screw.



5. Fit the pipe clip onto the bottom of the bigger plate using the remaining short screw and nut. Tighten the nut using a pair of pliers.

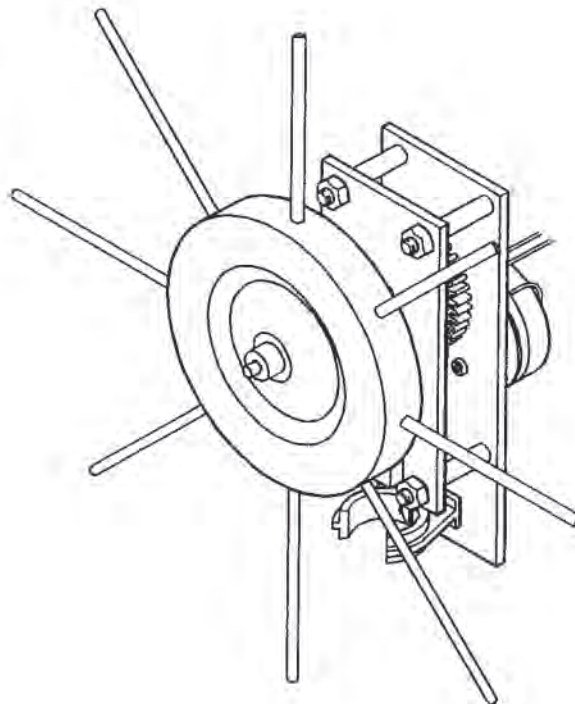


6. Push the large plastic wheel onto the end of the shaft.

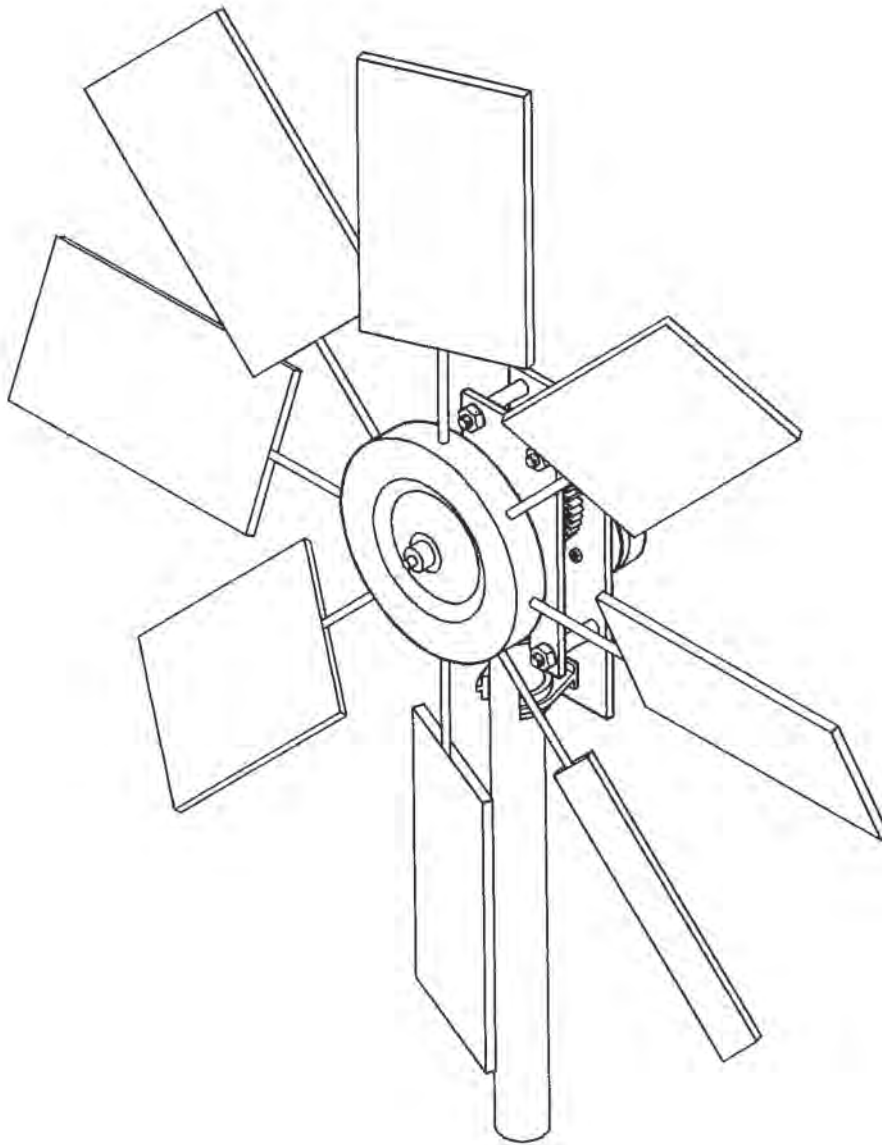


7. Carefully poke a metal rod into each of the eight holes in the big wheel.

Note: be careful when handling these rods. They may have sharp ends.



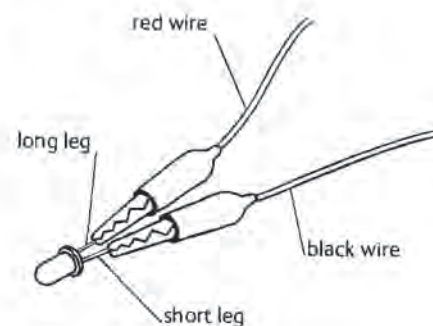
8. Slide a plastic blade onto each metal rod to complete the rotor. Slot the tube into the pipe clip to make a handle or stand for your turbine.



Using your wind-powered generator

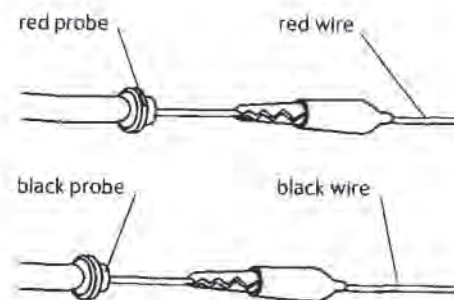
Your turbine will work outside in a reasonable wind but you can test it indoors using a desk fan. Make sure the blades are equally spaced from the centre of the shaft, then twist each one slightly (about five degrees).

In a reasonable wind your turbine will generate about five volts without anything connected. It is enough to light up an LED or charge a capacitor or rechargeable battery. You can test it by connecting the LED supplied as shown. Make sure the black wire is connected to the short leg of the LED and that the red and black wires do not touch each other.



Hold your turbine so it faces the wind and the rotor should begin to turn. The light emitting diode (LED) will light up when the rotor is turning in one direction but not the other. If your LED fails to light up, twist the blades the other way to reverse the direction of turning.

You can investigate the effect of increasing or decreasing the angle of blade twist. What happens if the blades have a large twist angle? What happens if the blades are positioned closer to or further away from the centre? If you have a multimeter you may use it to measure the output of your turbine. You would need to connect the probes from your multimeter to your generator as shown.



Activity E 8:**Electricity Quiz - Cubs****Instructions:**

Use the electricity cubs quiz sheet to test knowledge of your cub group. Answers can be placed on walls around room, cubs put into teams and team is to race to find and collect correct answer.

Equipment:

Cubs quiz sheet

Suggested Duration:

20 minutes

Additional Information:

Quiz Sheet

Cubs aged 8 – 11

1. What is energy from the sun called?

- a) wind energy
- b) solar energy
- c) wave power
- d) coal power

2. Where is electricity made?

- a) a power factory
- b) a power shop
- c) a power station
- d) a power farm

3. Renewable energy is what?

- a) energy that doesn't run out
- b) energy that is very cheap
- c) energy from coal
- d) energy from new power stations

4. Electricity from solar power cannot be made...

- a) in America
- b) at night
- c) for homes
- d) for watches and calculators

5. Hydro systems use what for energy?

- a) coal
- b) sugar cane
- c) rubbish
- d) running water

6. Greenhouse gases are...

- a) good for the atmosphere
- b) bad for the atmosphere
- c) bad for the sea
- d) good for the wind

7. Which one of these activities sends greenhouse gases into the atmosphere?

- a) running
- b) driving a car
- c) riding a bike
- d) washing the windows

8. Which of these is a greenhouse gas?

- a) Oxygen
- b) Carbon dioxide
- c) Nitrogen
- d) Hydrogen

9. What do you call the energy which comes from the heat of the Earth?

- a) Hydro electricity
- b) Geothermal energy
- c) Solar energy
- d) Bioenergy

10. What are the cells called that capture the sun's energy and turn it into electricity?

- a) Photo cells
- b) Blood cells
- c) Photovoltaic cells
- d) Solar electric cells

11. What does the word 'photo' mean in words like photosynthesis and photovoltaic?

- a) Light
- b) Colour
- c) Energy
- d) Picture

12. Which of the following cannot get its energy from solar power?

- a) A bike
- b) A torch
- c) A calculator
- d) A footpath

13. What does the term biomass mean?

- a) Under the sea
- b) All living material
- c) Oil and gas
- d) Energy from the Sun

14. What is a carbon footprint?

- a) Type of shoe
- b) Measure of our impact on the environment
- c) Gives us energy to run fast
- d) A carbon template

15. What is the piece of equipment called that helps us to use the energy from the wind to make electricity?

- a) A Hoover
- b) A fan
- c) A wind turbine
- d) A paper bag

16. Which one of the following is not a fossil fuel?

- a) Oil
- b) Coal
- c) Wood
- d) Gas

17. How much of our energy comes from fossil fuels?

- a) None
- b) Around 90%
- c) 40%
- d) A little bit

18. Biomass can take the form of:

- a) Logs
- b) Pellets
- c) Chips
- d) All of these

19. Why is the sea level rising because of climate change?

- a) Too much rain
- b) Melting ice at the south pole and from glaciers
- c) Too many ships in the ocean
- d) Too many people fishing

20. Hydro energy is renewable because

- a) Rain keeps falling
- b) There are lots of umbrellas
- c) Rain never falls
- d) You can buy Wellington boots

Activity E10:**Electricity Quiz - Scouts****Instructions:**

Use the electricity scouts quiz sheet to test knowledge of your scout group. Answers can be placed on walls around room, cubs put into teams and team is to race to find and collect correct answer.

Equipment:

Scouts quiz sheet

Suggested Duration:

20 minutes

Additional Information:

Quiz Sheet

**Multiple choice quiz for
scouts aged 11 – 14****1. Which of these statements are true?**

- a. Electricity from the mains is weaker than electricity from batteries.
- b. Mains electricity is made from lightning storms
- c. Mains electricity is very powerful and can be dangerous
- d. Electricity cannot jump gaps

2. Why must you never take electrical appliances into the bathroom?

- a. Electricity only works for a short time in the bathroom
- b. Electrical appliances don't work in the bathroom
- c. Electricity can easily pass through water and could hurt or kill you

3. What is an electricity meter?

- a. It measures the amount of electricity used
- b. It measures the distance electricity can jump
- c. It measures the amount of electricity a battery can generate

4. Where can you find high voltage electricity?

- a. In big houses
- b. In electricity substations
- c. In new electric cars
- d. In a battery

5. Which of these fuels is not used in power stations to produce electricity?

- a. Oil
- b. Coal
- c. Petrol
- d. Gas

Quiz Sheet**6. Why is mains electricity more dangerous than batteries?**

- a. Mains electricity is much more powerful than electricity from batteries
- b. Plugs are larger than batteries
- c. Batteries are in cases which protect you from the electricity inside them

7. How does electricity reach your home or school?

- a. Through an electricity meter and fuse box
- b. Using magnetism
- c. Through a hole in the wall using an on/off switch

8. Which of these statements is true?

- a. Electricity substations make good hiding places
- b. It is not possible to overload sockets in your home
- c. Electricity can kill you if you don't use it properly
- d. Pylons make good climbing frames

9. Why are electricity substations so dangerous?

- a. There can be poisonous weeds in them
- b. They contain high voltage electricity which can kill you
- c. They can be very hot
- d. There could be dangerous chemicals in them

10. Is it dangerous to fly a kite near overhead electricity lines

- a. Only if you fly the kite too high
- b. No, you can easily reel in a kite near overhead lines
- c. Yes, if the kite comes into contact with the overhead lines the electricity will pass through the string and you may be hurt or killed
- d. No, you can climb the pole and take it off the lines if it gets tangled up.

Quiz Sheet**11. What is an electricity conductor?**

- a. A conductor allows electricity to pass through it
- b. A conductor resists the passage of electricity
- c. It tells the violins when to play
- d. A conductor breaks electricity voltages down

12. What is an insulator?

- a. An insulator allows electricity to pass through it
- b. An insulator resists the passage of electricity
- c. An insulator keeps electricity at the correct temperature

13. Electricity is supplied to homes at:

- a. 240/400 Volts
- b. 11,000 Volts
- c. 33,000 Volts
- d. 110,000 volts

14. A transformer

- a. Increases or reduces the voltage applied to it.
- b. Is used to switch electricity on and off.
- c. Is used as a source of heat.
- d. Is used to store electricity

15. A circuit breaker:

- a. Is used to store electricity
- b. Is used to limit the flow of current
- c. Is an earth wire
- d. Is a transformer

Quiz Sheet**16. Is the following statement true or false?**

A current of less than 100 milli-amps is sufficient to stop a person's heart from beating

- a. True
- b. False

17. Coming into contact with electricity equipment can cause:

- a. Death
- b. Electric shock
- c. Electrical burns
- d. Loss of muscle control
- e. All of the above

18. Where is electricity produced?

- a. Substation
- b. Power station
- c. Transformer
- d. Meter box

19. A substation reduces electricity voltage so it can travel on smaller power lines or underground cables.

- a. True
- b. False

20. Why can birds sit on electricity lines?

- a. Electricity does not kill birds
- b. Birds are not touching any other wires and electricity cannot go through them to the ground
- c. They are light

GAS

Activity G1:**Game: Electricity, Gas, Water****Instructions:**

- Cub scouts sit in a large circle, with a Leader standing in the centre.
- The leader throws a beanbag to the first cub and calls out either 'Gas' 'Electricity' 'Water'
- The Cub Scout tries to catch the bean bag and reply with a connected word with the element. For example:
 - Gas – cooking
 - Electricity – lights
 - Water – swimming

Equipment:

Bean Bags

Suggested duration:

From 15mins to 20mins

Additional information:

You might start with the young people standing, and if they drop the bean bag, or can't think of a word, they go down on one knee etc.

Activity G2:

How we get natural gas

Instructions:

- Have a discussion on how gas is produced and where the gas in Northern Ireland comes from.
- Get a large bottle used for making wine, together with a water trap which plugs into the top of the bottle
- Chop up waste leaves, grass, ferns or whatever green matter comes to hand. Half fill the bottle, then top up the bottle with water to the neck. Put the water trap in the top.
- Observe when gas bubbles start to appear and when the gas produced starts bubbling up through the water trap. Keep a record each week of what is happening.

Equipment:

Large bottle
Water trap
Waste leaves, grass, ferns
Water

Suggested Duration:

45mins

Additional Information:

Natural Gas is supplied to homes from out of the ground in places as far away as the North Sea and even Russia. It is pumped out of the ground and distributed to homes and factories via pipes after some treatment. It is essentially methane. It was trapped in the ground millions of years ago when huge trees and ferns died and became trapped in mud. When plants die and rot in the absence of air the organic matter produces methane.

Activity G3:

Energy Audit – Thermal Imaging

Instructions:

- Phoenix Natural Gas will conduct an energy audit of the scout building using thermal imaging cameras – scout groups to watch, ask questions and discuss results

Equipment:

Supplied by Phoenix Natural Gas

Suggested Duration:

1 hour in total

Additional Information:

Contact: Simon Little, Phoenix Natural Gas to arrange:
028 9055 5541

Activity G7:

Carbon monoxide detection and Volt stick demonstration

Instructions:

- A demonstration of a volt stick – either at Phoenix Natural Gas Headquarters or at the Scout Hall. (Volt Stick is the instrument for safely checking the presence of an A.C. Voltage, without making any disconnections in cables, wall sockets, fuses, circuit breakers, junction boxes etc.)
- Phoenix Natural Gas will provide a Gasco seeker demonstration on detection of gas and Carbon Monoxide levels

Equipment:

Supplied by Phoenix Natural Gas

Suggested Duration:

2 hours in total

Additional Information:

Contact: Simon Little, Phoenix Natural Gas to arrange:
028 9055 5541

Phoenix Natural Gas
197 Airport Road West
Belfast
BT3 9ED

Activity G5:

Flame Gas Museum, Carrickfergus

Instructions: Visit Flame Gas Museum

Suggested Duration: 2 hours in total

Additional Information: Flame gasworks is Ireland's sole surviving coal gasworks and is one of only three left in the British Isles
Opened in 1855, it supplied Carrickfergus with gas until 1965 and was closed in 1987
It is now fully restored and was reopened as a visitor and educational attraction in August 2002

This museum gives visitors the opportunity to:

- See Europe's largest surviving set of horizontal retorts
- Find out how gas was used through the decades
- Ascend the working gasholder for panoramic views of the town

Flame Gas Museum
44 Irish Quarter West
Carrickfergus
County Antrim
BT38 8AT
T: 028 9336 9575
E: info@flamegasworks.co.uk

Contact: Simon Little, Phoenix Natural Gas to arrange a Phoenix Natural Gas Engineer to attend if required : 028 9055 5541

Activity G6:**Visit – Demonstration of Poly Pipe
fusion Phoenix Natural Gas HQ****Instructions:**

- Visit Phoenix Natural Gas Limited HQ and observe demonstration followed by Q&A session

Equipment:

Supplied by Phoenix Natural Gas

Suggested Duration:

2 hours in total

Additional Information:

Contact: Simon Little, Phoenix Natural Gas to arrange:
028 9055 5541

Phoenix Natural Gas
197 Airport Road West
Belfast
BT3 9ED

Water



Activity W1:

Game: Electricity, Gas, Water

Instructions:

- Cub scouts sit in a large circle, with a Leader standing in the centre.
- The leader throws a beanbag to the first cub and calls out either 'Gas' 'Electricity' 'Water'
- The Cub Scout tries to catch the bean bag and reply with a connected word with the element. For example:
 - Gas – cooking
 - Electricity – lights
 - Water – swimming

Equipment:

Bean Bags

Suggested duration:

From 15mins to 20mins

Additional information:

You might start with the young people standing, and if they drop the bean bag, or can't think of a word, they go down on one knee etc.



Activity W2:

Water Facts

Instructions:

Use information sheet and demonstrations to discuss the states of water.

Equipment:

Information sheet
1 bottle clean water
3 different shaped empty containers
Kettle
Plate
Ice cubes
Globe or world map

Suggested Duration:

20 minutes

Additional Information:

Demonstration sheet

Northern Ireland

Water Facts

Demonstration instructions shown in blue

- Water is found naturally as a solid , liquid or gas
- The chemical symbol for water is H₂O
- **Show bottle of water.** How would you describe water?
- Water as a liquid can change shape – **pour into different objects**
- Can water come in different forms or does it always look like this?
- What can we do to change it?
- Add heat - **boil kettle - what happens to the water?** Changes to a gas
- What do we call this gas? Steam/water vapour
- How would you describe steam – how is it different from water?
- It fills the space- all around us
- What is it called when we heat the water and it changes from a liquid into a gas?
Liquid water turns to gas (steam) by evaporating
- This is what happens when the sun shines on the rivers, ponds, puddles
- If we cool down the steam what happens?
- **Place cold plate over steam of kettle.** What starts to happen?
- Condensation gas(steam) turns back into a liquid
- This is what happens to form clouds: as the steam rises it cools
- If the drops of liquid gather together and get too heavy they start to fall under gravity.
Clouds are made from tiny droplets of water or ice crystals
- This is what happens in the clouds and it starts to rain
- What happens if we cool the liquid? **Solid-ice (show ice cubes)**

- They remain a fixed shape and are hard
- What would happen if you heat up the ice? Solid water melts to turn back into liquid water. Liquid water turns to solid water by freezing
- Global warming is causing our world to get warmer and icebergs starting to melt more water in sea leading to increased sea level and flooding
- **Show a globe or picture of world** 97% of the world's water is salt water, 3% is fresh water but 2% of this is locked up as ice, so we only have 1% available for drinking etc.
- All living things need water to stay alive
- We can't drink the seawater as it is too salty it has to be cleaned by NIWater
- Reservoir water is filtered to remove dirt particles
- The germs in drinking water are killed by adding chlorine
- NI Water supplies 625 million litres of clean water daily
- The blue plastic pipes carrying clean water to our homes
- The brown wastewater pipes to the Wastewater Treatment Works are called sewers
- Sewage is a mixture of water body waste, dissolved things and bacteria
- 1 gram of human waste contains over 10 million viruses

Activity W3:

Water Quiz

Instructions:

Use the Water quiz to test knowledge of Cub group. Answers can be placed on walls around room, cubs put into teams and team is to race to find and collect correct answer.

Equipment:

NI Water quiz sheet

Suggested Duration:

20 minutes

Additional Information:

Activity W3:

Water Cycle Quiz for Cubs

Question	Answer
What is the chemical symbol for water ?	<ul style="list-style-type: none"> • 2OH • H₂O • 2HO
What "cycle" moves the water around earth?	<ul style="list-style-type: none"> • Bio cycle • Water cycle • Tri cycle
How does liquid water become gas (steam)?	<ul style="list-style-type: none"> • evaporating • freezing • melting
How does liquid water change to solid water (ice)?	<ul style="list-style-type: none"> • evaporating • freezing • melting
What is added to drinking water to kill germs ?	<ul style="list-style-type: none"> • Oxygen • Chlorine • Hydrogen
How much of the earth's water is fresh water ?	<ul style="list-style-type: none"> • 1/3 or 33% • 3/4 or 75% • 1/10 or 1%
Where is most of the world's water is contained ?	<ul style="list-style-type: none"> • oceans and seas • mountains and land
How does solid water (ice) change to liquid?	<ul style="list-style-type: none"> • evaporating • freezing • melting
Why can we not drink sea water?	<ul style="list-style-type: none"> • it is salty • its too sweet • its too bitter
How much of the earth is covered in water?	<ul style="list-style-type: none"> • 3/4 or 75% • 1/2 or 50% • 1/4 or 25%

What colour are the pipes that bring us clean safe drinking water	<ul style="list-style-type: none"> • red • blue • brown
When the rain falls, what does NI Water store the water in?	<ul style="list-style-type: none"> • reservoir • cup • waterbutt
How does clean drinking water get to our homes	<ul style="list-style-type: none"> • underground pipes • through the door • overground pipes
What are the three ways we can find water on earth solid, liquid and g...	<ul style="list-style-type: none"> • Gas • grime • glue
What are the pipes called that take away our wastewater	<ul style="list-style-type: none"> • sewers • gulleys • trench
How many litres of water does NI Water clean everyday	<ul style="list-style-type: none"> • 625 million • 100 million • 300 million
How is dirt removed from reservoir water?	<ul style="list-style-type: none"> • Filtered • Strained • hoovered
What do all living things need to stay alive?	<ul style="list-style-type: none"> • Chocolate • Water • exercise
What colour are the pipes which take away our dirty water	<ul style="list-style-type: none"> • Red • Blue • Brown
How old is water on earth?	<ul style="list-style-type: none"> • 1 day • 100 years • More 1000000 years

Activity W4:

Water Quiz for Scouts

Instructions:

Use the Water quiz to test knowledge of Scout group. Answers can be placed on walls around room, cubs put into teams and team is to race to find and collect correct answer.

Equipment:

NI Water quiz sheet

Suggested Duration:

20 minutes

Additional Information:

Activity W4:

Water Conservation Quiz for Scouts

Question	Answer
On average, how much water do we each use daily in Northern Ireland?	<ul style="list-style-type: none"> • 210 litres • 150 litres • 35 litres
How much water is used daily by each person in the developing world?	<ul style="list-style-type: none"> • 10 litres • 100 litres • 50 litres
How much water per minute does a running tap use?	<ul style="list-style-type: none"> • 6 litres • 12 litres • 20 litres
How many litres of water are used when a toilet is flushed?	<ul style="list-style-type: none"> • 2 litres • 6 litres • 12 litres
How much water is used by a hose in 15 mins.?	<ul style="list-style-type: none"> • 145 litres • 135 litres • 150 litres
What is the best way to collect water for the garden?	<ul style="list-style-type: none"> • In a cup • In a waterbutt • In a bag
When washing vegetables in the sink	<ul style="list-style-type: none"> • Leave the tap running • Don't put in plug • Use a basin and recycle the water
Which uses least water?	<ul style="list-style-type: none"> • A standard shower • A power shower • A bath
How much water is used to fill a bath?	<ul style="list-style-type: none"> • 100 litres • 80 litres • 60 litres
What should you NOT do to stop pipes freezing in winter	<ul style="list-style-type: none"> • cover up the pipes • leave the heating on low • leave taps running

How many litres does a dripping tap waste in a year	<ul style="list-style-type: none"> • 5,500 litres • 2,200 litres • 7,700 litres
How many litres does a Hippo Bag save?	<ul style="list-style-type: none"> • 10 litres • 3 litres • 6 litres
When is the best time of day to water your garden	<ul style="list-style-type: none"> • morning • afternoon • evening
When watering the garden you should use	<ul style="list-style-type: none"> • hose • watering can • sprinkler
What should you NOT do if you have a burst pipe	<ul style="list-style-type: none"> • turn off the taps • turn off the stop tap • call the plumber
Which setting is best to use for a small load of washing	<ul style="list-style-type: none"> • full load • half load • handwash
Putting mulch onto soil helps to prevent	<ul style="list-style-type: none"> • evaporation • condensation • transpiration
How much water is used when brushing teeth with the tap on?	<ul style="list-style-type: none"> • 2 litres • 6 litres • 8 litres
Where is stop tap normally found?	<ul style="list-style-type: none"> • outside • under the kitchen sink • in the bathroom
How much water is used in a 5 minute shower?	<ul style="list-style-type: none"> • 35 litres • 65 litres • 85 litres
To save electricity, water and money when boiling the kettle always	<ul style="list-style-type: none"> • fill it to the top • fill it half way • put in the amount you need
What is put around pipes to protect them from frost and prevent them from bursting and leaking	<ul style="list-style-type: none"> • plastic • newspaper • lagging

Activity W5:**Game: How much water do we use each day?****Instructions:**

Match the amounts of water to the activities listed

Equipment:

Water Wise worksheet
1 litre clean water
pencils

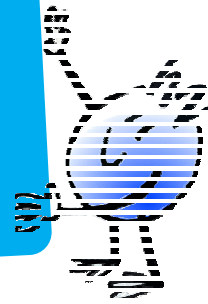
Suggested Duration:

10 minutes

Additional Information:

H₂O's Water Wise Worksheet

**Match the activity
with the amount
of water it uses**



- | | |
|---|------------|
| 1. brushing teeth with the tap on | 9 litres |
| 2. 5 minute shower | 6 litres |
| 3. taking a bath | 135 litres |
| 4. using the washing machine | 35 litres |
| 5. brushing teeth with the tap off | 60 litres |
| 6. flushing the toilet | 80 litres |
| 7. washing the car with bucket and sponge | 1 litre |
| 8. using the hose for 15mins | 40 litres |
| 9. 5 minute power shower | 15 litres |
| 10. using the dishwasher | 90 litres |

Activity W6:

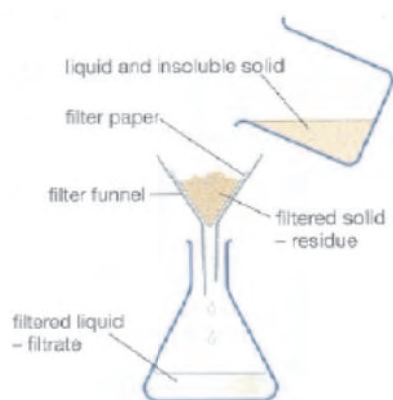
Water filtration

Instructions:

- Give facts about NI Water from information sheet
- Use the photos to explain the four stages of cleaning using the notes

Filtration:

- Take 1 plastic bottle cut in half
- Place the top of the bottle upside down in the bottom
- Place one piece of cotton wool in the neck of the bottle to plug the hole
- Pour 1 cup of sand into the top of the bottle
- Pour 1 cup of dirty water into the sand
- Watch the water collect in the bottom of the bottle



Equipment:

NI Water fact sheet
 NI Water Photo cards – How water is cleaned
 2 litre plastic bottles cut in half. (enough for 1 between 2)
 Sand (preferably beach sand, as this is coarse)
 Plastic cups
 1 large bottle of dirty water
 Cotton wool balls

Suggested Duration: 20 minutes

Northern Ireland**Water Facts**

- Northern Ireland Water provides 625 million litres of clean water a day to almost 1.7 million people across Northern Ireland
- There are 26,500km of water pipes in Northern Ireland
- There are 14,500km of sewers in Northern Ireland

Northern Ireland Water own:

- 40 reservoirs
- 44 major water treatment works
- 1,124 wastewater treatment works
- 287 water pumping stations
- 1194 wastewater pumping stations



The Belfast Sewers Project

NI Water

How we clean our water

Northern Ireland Water collects and stores water in man made reservoirs, or pumps water from natural lakes. This water may look clean but it can contain dirt, germs and chemicals which are harmful. Northern Ireland Water has to clean the water to make it safe for us to use and drink.

How is the water cleaned?

Water from the reservoir or lake is pumped to a **Water Treatment Works** where it is cleaned.

1. **Screening:** Leaves, twigs and large objects are removed by large sieves.
2. **Clarification:** A chemical called Alum is added to the water making the mud and silt stick together to form sludge.
3. **Dissolved air floatation:** Air is pumped into the water making the sludge float to the top. The floating sludge is then easily removed by large scrapers.
4. **Filtration:** The water passes through two special sand beds which trap any dirt that is left.
5. **Chlorination:** The chemical chlorine is added to kill any germs and bacteria in the water we cannot see, just like in the swimming pool.

The water is now clean, clear and safe to drink. It is pumped through pipes under the ground and taken to our homes, schools and factories ready for us to use when we turn on the tap.

How we clean our wastewater

When we use water in our homes, factories and schools we make it dirty. We call this dirty water **wastewater**. Wastewater has to be cleaned before we can put it back into our rivers and oceans.

How is wastewater cleaned?

Wastewater flows through pipes under the ground called sewers to be cleaned at a Wastewater Treatment Works. Here they clean the wastewater and remove any things that could be harmful to the environment.

There are five stages at the Wastewater Treatment Works:

1. **Screening:** screens trap any rubbish like bits of plastic or wood
2. **Grit removal:** small stones and grit are removed from the water so they don't damage machinery
3. **Sedimentation:** the water rests in large tanks where any solids sink to the bottom and form sludge. The sludge is removed and treated to make it safe.
4. **Bug attack:** good bugs are added to the wastewater which eat up any harmful chemicals & waste
5. **Final settlement:** the wastewater enters settlement tanks where any remaining waste sinks to the bottom.

The water is now clean and is safe to be returned to our rivers and oceans.



Silent Valley Reservoir in the Mourne Mountains supplies water for Belfast

WATER TREATMENT



Stage 1: Screening



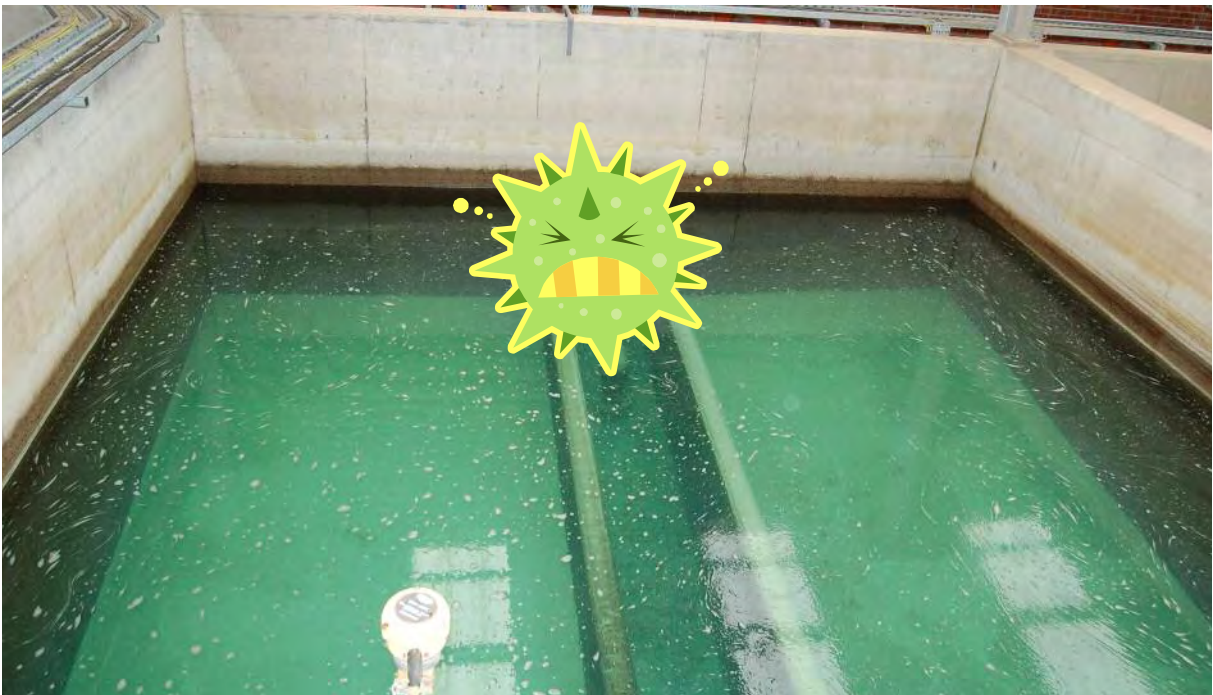
Stage 2: Clarification



Stage 3: Dissolved air floatation



Stage 4: Filtration



Stage 5: Chlorination

Activity W7:

The Watercycle

Instructions:

- Using watercycle sheet, cut out the various elements of the cycle and give a set to the cubs (one between two).
- Ask the scouts to place the pictures on a black board in the correct order

Equipment:

NI Water Water Cycle sheets
NI Water Water Cycle poster
Glue
Scissors

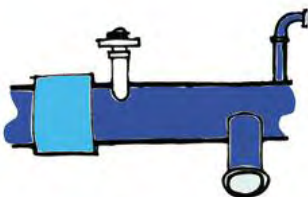
Suggested Duration:

20 minutes

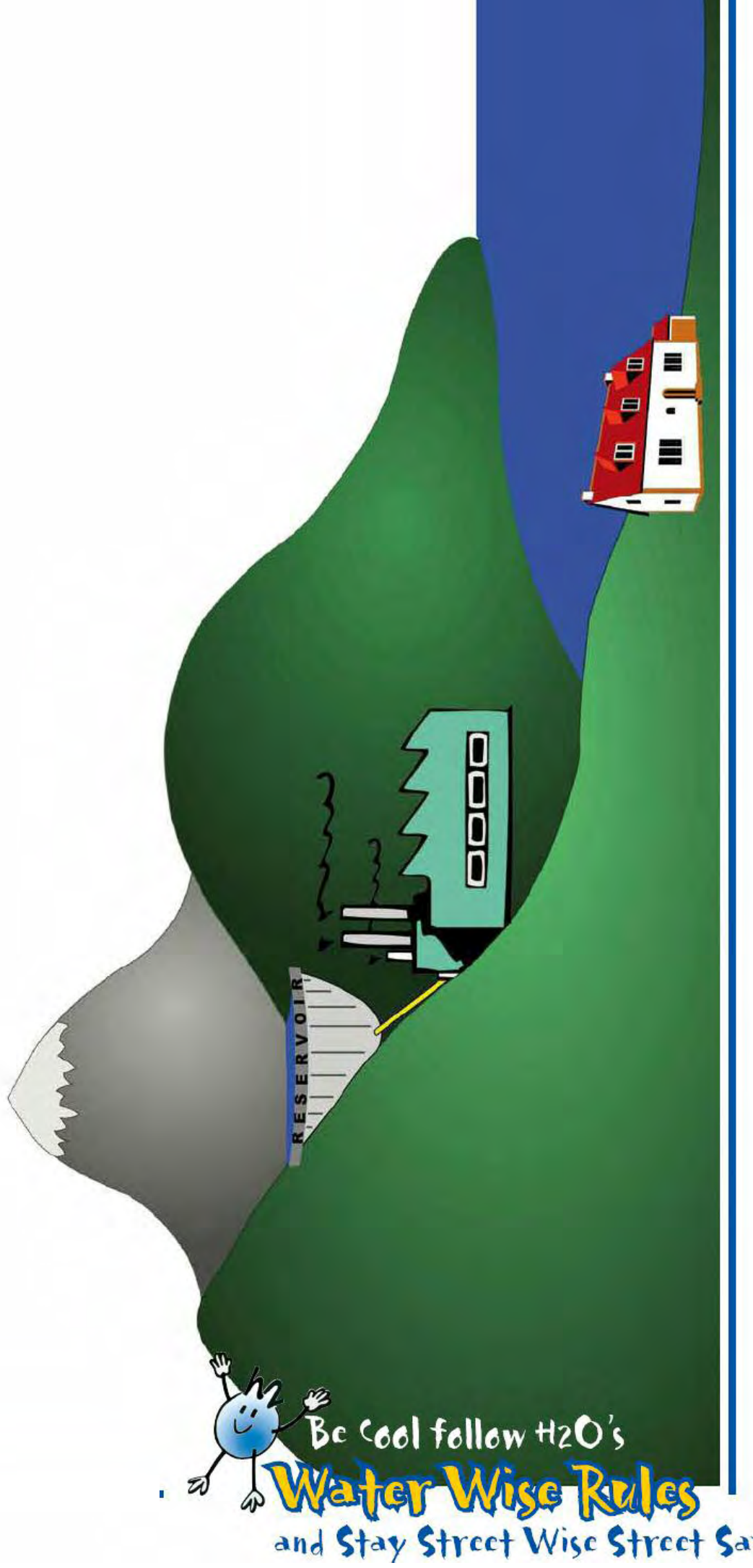
H₂O's Water Wise Worksheet

Watercycle game

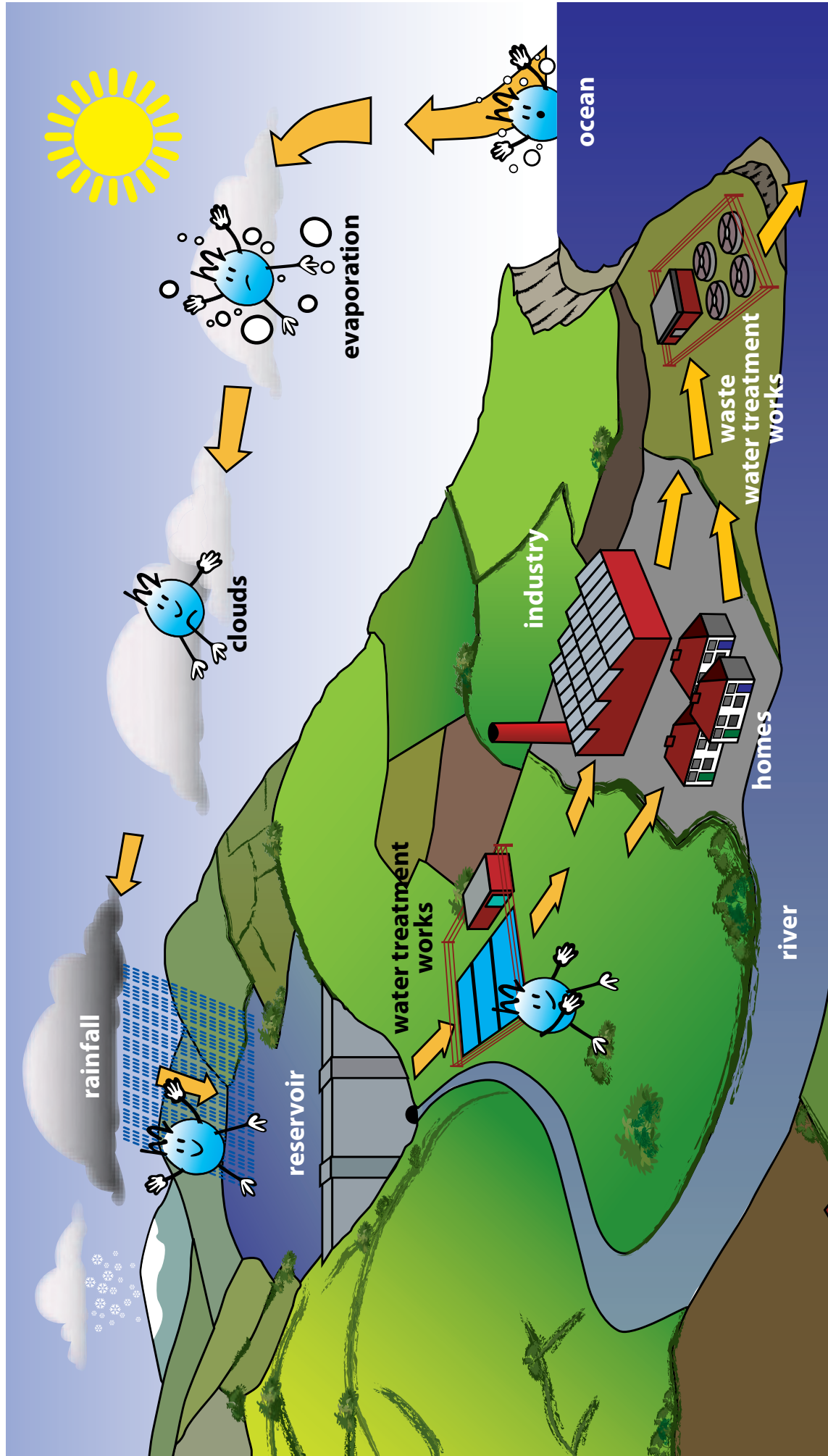
Cut out the pictures below and place them where you think they should go in the Water Cycle



Water Cycle placement game



The Water Cycle



Activity W8:**Game: Water Cycle****Instructions:**

- Cubs sit in a large circle
- Leader stand in the centre
- Leader throws the ball to the first cub and shouts a word connected to the watercycle eg reservoir
- Cub catches the ball and replies with the first letter of the word eg "R"
- If the ball is dropped or the wrong letter is given the cub sits down or kneels on one knee
- This continues around the circle until the whole word is spelt correctly
- The sequence is repeated using different words until one person is left standing.

Equipment:

One ball

Suggested Duration:

15 minutes

Additional Information:

Suggested words:

Reservoir

Water

Treatment works

Clouds

Rainfall

River

Ocean

Evaporation

Condensation

Wastewater

Sun

Activity W9:**Game: Circle of Water****Instructions:**

- Group sits in a large circle
- Four words connected with the watercycle are selected eg cloud, rain, reservoir, ocean
- The leader walks around the circle naming each player in turn, right around the circle until each player has one of the four names
- The leader calls "cloud" all the clouds get up and run around the circle and back to their place.
- The last one to sit down is out
- This is repeated alternating the words
- Occasionally call out the word "watercycle" all of the group get up and run round in a circle and back to their place.
- Continue until one person is left.

Equipment:

Suggested Duration: 10 minutes

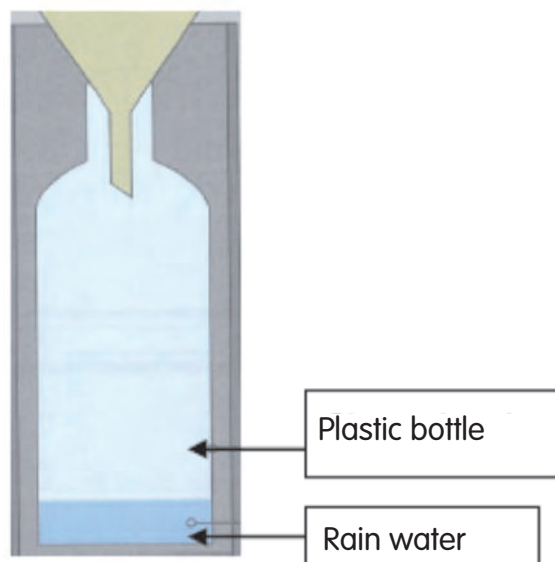
Additional Information:

Activity W10:

Make a Rain Gauge

Instructions:

- Take 1 plastic bottle cut in half
- Place the top of the bottle upside down in the bottom half
- Label with team names and the date stick onto the bottom half
- Place the bottle outside your building by digging a small hole and place it into the space or leave it in a safe place so it won't be blown or knocked over.
- Leave for 1 or 2 weeks depending on the weather.
- Carefully carry the bottles inside tip the water into the measuring jug and measure the amount of rainfall

**Equipment:**

2 litre plastic bottles cut in half or provide scissors
Labels and waterproof pen
trowel
Measuring jug

Suggested Duration:

30 minutes – two sessions over two week period

Activity W11:

Protecting pipes from frost

Instructions:

- Divide the group into 4's give each person a jam jar with a lid
- Set up the four jars as shown in the diagram below
- Place in each jar several cubes of ice
- Cover the jars and leave for 20/30minutes
- Record the jam jar with the most water ie has melted the most
- Record the jam jar which has the most ice
- Which jar had the best insulating cover?



uncovered



wallpaper



polystyrene



cotton wool

Equipment:

- 4 jam jars with lids per group
- 1 pair of scissors per group
- masking tape
- sheet of polystyrene wrap, roll of wall paper, roll of cotton wool to be divided evenly per group
- icebox of ice

Suggested Duration: 30 minutes

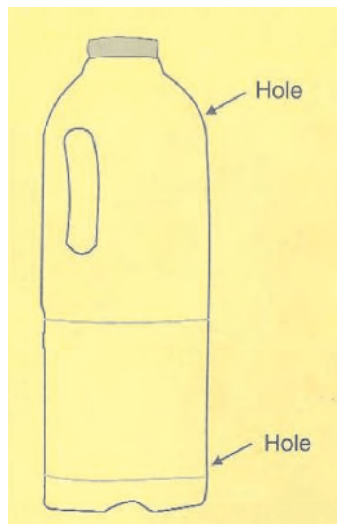
Additional Information:

Activity W12:

Making a planter water feeder

Instructions:

- Using a sewing needle simply put 2 pinholes into your milk container, one near the top and the other 2.5cm from the bottom.
- Fill with water and replace the cap.
- brighten up your container with colourful paints
Place it beside your plants or in your hanging basket for hours of slow release



Fill it up with

- Water from your water butt
- Cool water from your hot tap that is usually wasted
- Water used to wash salads
- Old bath water

Equipment:

Milk container
Sewing needle
Items to decorate- paints, pens etc.

Suggested Duration:

20 minutes

Activity W13:**Visit: Silent Valley**

Instructions: Visit Silent Valley and complete the orienteering course

Suggested Duration: 3 hours

Additional Information: Free entry into Silent Valley through NI Water Education. Orienteering maps can be purchased from Hill Treker, Promenade, Newcastle.



Silent Valley Reservoir in the Mourne Mountains supplies water for Belfast

Activity W14:**Quiz: Water Conservation****Instructions:**

Run the quiz based on the NI Water Water Conservation top tips sheet

1. Introduce the fact that the players are going to be drops of water
2. One end of the room is saving water
3. Opposite end is wasting water
4. Call out ways water can be wasted or saved the group runs from one end to the other depending on the action. The last one to reach the end is out.

When the following 4 are mentioned the water will be saved and they have to perform the following

- a. call hippo bag- stand still
- b. call trigger hose- crouch down
- c. shower timer- stand still hands above head
- d. waterbutt- hop on one leg
5. the last to perform the action or do the wrong action is out
6. last person left wins

Equipment:

NI Water Water Conservation top tips sheet

Suggested Duration:

20minutes

Additional Information:

NI Water

Conservation top tips

In Northern Ireland we each use on average 150 litres of water everyday. Due to the amount of rain we receive in Northern Ireland you may not think we need to save water but with climate change and global warming we don't know how this will affect our future rainfall so the earlier we learn to conserve water the better it will be for our future. The cleaning of water is also an expensive business, using large amounts of energy and chemicals to ensure our water is safe to drink. It is therefore important not to waste it and by conserving water we can reduce our CO2 emissions and carbon footprint.

What can we do to help?

- A running tap wastes 6 litres of water per minute always turn a tap off when not in use
- Turn off the tap while brushing your teeth
- Put the plug in while washing dishes, vegetables or when shaving. Or fill a basin and use the water to water the plants once you have finished. Soapy suds are great for killing green fly
- Down the loo: about $\frac{1}{4}$ of all the clean drinkable water we use in our homes is flushed down the toilet.

When buying a new toilet look out for water efficient models or one with a dual flush. Old toilets use 9 litres per flush compared to new loos which use only 6

- If you have an older toilet use a hippo bag or other displacement device in your cistern to reduce your water usage from 9-6 litres
- Stop the drips: a dripping tap can waste at least 5,500 litres of water a year!
- Fully loaded: fill up the dishwasher and washing machine or use the half load option, not only will it save water but will help reduce your CO2 emissions
- Baths: A bath can use up a lot of water (around 80 litres) while a shower uses much less (around 35 litres). But beware a power shower uses more than a bath if you shower for 5 minutes or more (around 90 litres)
- Fill a jug with tap water and leave it to cool in the fridge instead of keeping the tap running: if your water is cloudy it is probably because there is some compressed air in your pipes, leave the water to stand and the water should clear quickly. If you can

smell the chlorine in your water leave it to stand in a jug in the fridge and the chlorine will evaporate (chlorine is needed in water to ensure all the bacteria and germs are removed, the small amount of chlorine in the water is harmless to humans.)

- When boiling the kettle only fill to the amount needed: saves water and electricity

In the garden

- Use a watering can not a hose. In 15 minutes a hose can use 135 litres of water
- If using a hose try to use a trigger nozzle which uses less water
- Invest in a Waterbutt- these can be bought at local garden centres, DIY stores, and online at M&S.
- Sprinklers can use as much as 1000 litres of water per hour- more than a family of 4 uses in a whole day!!
- Use a bucket and sponge to wash the car not a hose
- Water plants early in the morning or late in the evening to reduce evaporation
- If you place a planted pot underneath a hanging basket, the pot will catch the overspill when you water it.
- Mix in some gel crystals (available from garden centres and DIY stores) with your compost. They swell when water is added and as the pot dries out the plants take back the moisture from the gel.
- Choose drought tolerant plants which require less water
- Use mulch such as bark chips, gravel or pebbles to cover the soil. This helps to keep the moisture in the soil and looks good!!

Activity W15:

Cleaning water with charcoal

Instructions:

- Have a wood fire but allow it to go out before the wood is burnt away.
- Wait until the fire is cold, chip off lumps of charcoal and break them into small pieces no bigger than the size of a pea.
- Wash the charcoal, collect a pile about the size of a grapefruit, put them inside the bottom of an old stocking or wrap them up in a piece of thin cloth
- Take a plastic funnel large enough to take the collection of charcoal pieces. Put a plug of cotton wool in the mouth of the funnel. Put a tablespoon of coarse sand on top and wash it through. Put the charcoal in the stocking on top of the sand and press it down so that it sits firmly in the funnel. Wash through with water.
- Get a small pot or cup, put some water into it, wet a paint brush and wipe it on any colour in a water colour palette and dip the brush in the pot of water. It is only necessary to put a tint of colour in the water.
- Put the water into the funnel and collect what comes out, the filtrate, in another pot. It should come through colourless but it will certainly come through much paler. If it comes through pale, wash the charcoal, let the water drain through and put the filtrate through again.

**Equipment:**

Wood
Stocking/thin cloth
Plastic funnel
Cotton wool
Tablespoon coarse sand
Two small cups
Paint brush
Water colour palette

Suggested Duration:

45mins

Additional Information:

Charcoal absorbs dissolved organic substances. It is used in bygone times in rural communities when water was taken from local streams and purified before drinking. It is still used in less developed communities in other countries. An advanced form of processed charcoal called activated carbon is used to purify water in modern water treatment works. It takes out substances like pesticides.

Feedback

1) What activities did your Scout Group(s) complete?

2) What Utility areas did your Scout group(s) find most interesting?

3) What tasks worked well for your Scout group(s)

4) What tasks did not work well for your Scout group(s)

5) What have your Scout group(s) learned from completing these activities?

6) Suggestions for improvement

