NET Zero

Guide for schools

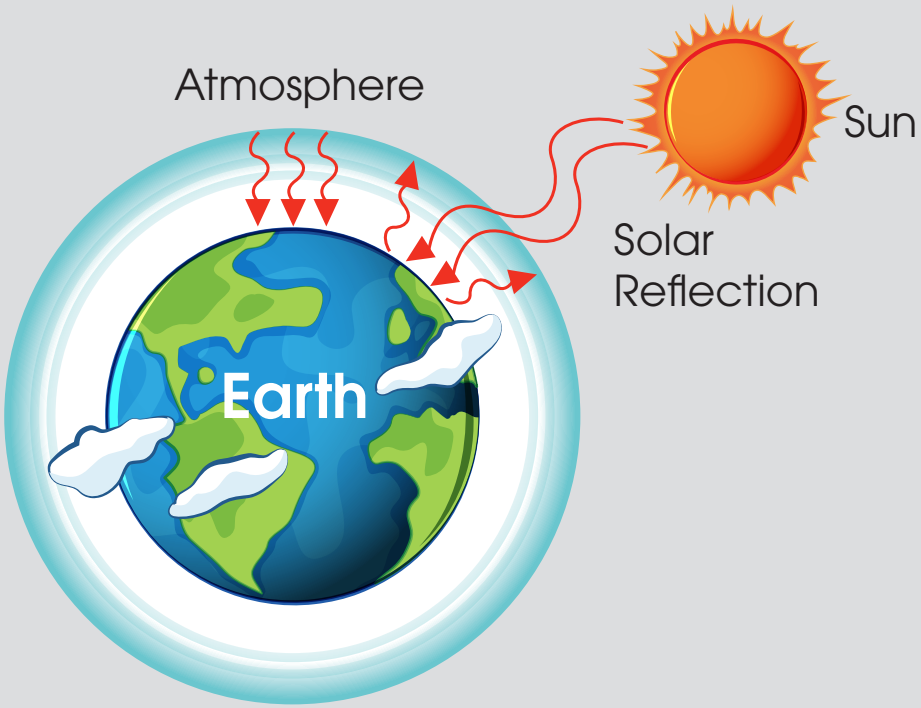
Angus Council

Comhairle Aonghais

Contents

What is global warming?

The Greenhouse Effect



The Earth is warmed by rays from the Sun, which are reflected back into space.

Layers of natural gases surround the Earth and act like a blanket, keeping the Earth at the right temperature.

But if extra gases are made, the blanket gets thicker and the Earth gets warmer.

Climate change is the result of rising greenhouse gas emissions which cause global temperatures to increase. The impact of this is already being felt around the world. If emissions are not drastically reduced, severe widespread impacts are expected such as changing seasons could make farming more difficult, extreme weather events could cause flooding or droughts, animal species may suffer as their habitats are changed or destroyed and sea levels may rise.

Check out the National Geographic website for more info: https://www.natgeokids.com/uk/discover/ geography/general-geography/what-is-climate- change/

Don't worry, it's not all doom and gloom! In November 2021, the **Glasgow COP26** conference ended in success. Nearly 200 countries agreed to work together to limit the global temperature increase to 1.5 degrees C to avoid the worst impacts of Climate Change.

Can you design a poster to warn about the impacts of global warming, or how it can be reduced.

Have a look at the 2 next pages … have a game of Climate Change Snakes and Ladders with your friends or complete the Climate Change Wordsearch.


START
FINISH
You forgot to switch off the lights. Miss a turn.
You eat locally sourced vegetables. Move forward 2 spaces.
Wind energy gives you a boost. Move forward 2 spaces.
You planted some trees! Take the shortcut to 14
You left your mobile charger plugged in. Go back 2 spaces.
You recycle your waste. Roll again.
Your home is not well insulated. Miss a turn.
You accepted plastic bags while shopping. Go back 2 spaces.
You cycle to school instead of going by car. Bike to 19.
You take a shower instead of a bath. Move forward 1 space.
You take the train instead of the plane. Roll again.
You use renewable energy to power your home. Move forward 2 spaces
It's cold. You turn up the heating instead of putting on a sweater. Go back 3 spaces.
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Word search
CLIMATE CHANGE

You can go up, down, forwards, backwards or diagonally in this wordsearch.
Why not time yourself to see how long it takes you to find all the words?

CLIMATECHANGE
TEMPERATURE
FLOODING
CARBONDIOXIDE
DROUGHT
CARBONFOOTPRINT
POLLUTION
GLOBALWARMING
GREEN
GREENHOUSEGAS
FOSSILFUEL
SUSTAINABILITY
WEATHER
BIOFUEL
ENVIRONMENT
EXTINCTION
RENEWABLEENERGY
METHANE
BIODIVERSITY
RECYCLE

C L I M A T E C H A N G E N S C
Y G L O B A L W A R M I N G Y R
T E T N E M N O R I V N E G S E
I L E U F L I S S O F I R B E C
L T E M P E R A T U R E I S N Y
I T N I R P T O O F N O B R A C
B R E H T A E W R E D I O U H L
A D E G E A I R E I I I T N T E
N R S R E A A L V R O O E B E C
I O E E B A B E R G L O T P M U
A U R E F A R R L E U F O I B D
T G O N W S G N I D O O L F B I
S H E E I N O I T U L L O P T P
U T N T E X T I N C T I O N L M
S E Y C A R B O N D I O X I D E
R S A G E S U O H N E E R G L B

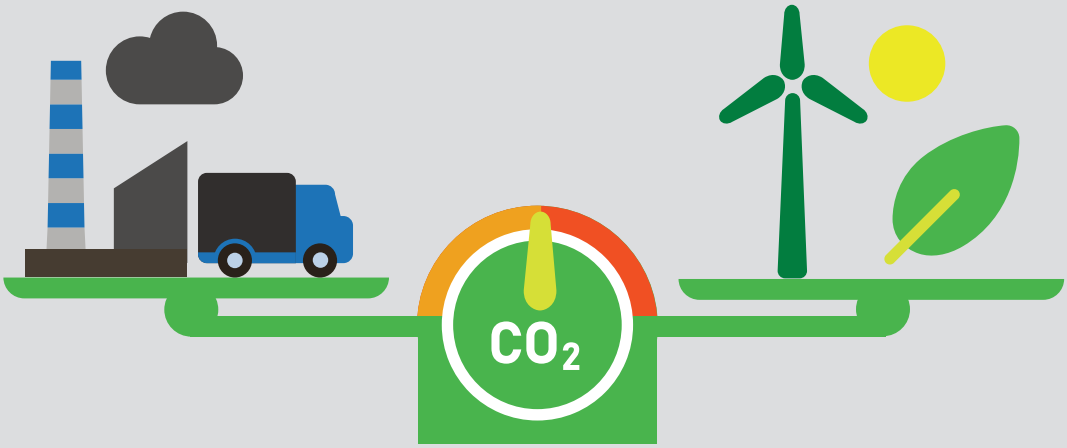
practicalaction.org/schools/climate-change-word-search

Practical ACTION

LET'S DO NET ZERO

Scotland will play its part in limiting global temperatures and Climate Change by becoming Net Zero by 2045.

Imagine a set of scales, we need to keep them balanced to achieve **Net Zero.**



We balance the scales by cutting the amount of greenhouse gases we put into the atmosphere, by replacing old polluting technology with new greener technology, and by making sure any gases we do release can be removed (for example by planting more trees).

Check out this YouTube clip for more info on climate change and Net Zero: https://www.youtube.com/ watch?v=vAB2GXoQSFM

Have a think about what types of things in your day to day life need balanced...

What things do you currently do that release polluting greenhouse gases?

What could you do differently to balance it out, and become Net Zero?

At **School** you can help achieve **Net Zero** by becoming **Climate Action Super Heroes!**

To accept your mission, click here!

https://www.un.org/ sustainabledevelopment/climate-action-superheroes/

At **School** the main ways you can help achieve Net Zero are:

- Using electricity, heating and water wisely
- Reducing waste & recycling
- Using less transport and taking part in more active travel
- Increasing biodiversity in the playground

The following pages will give you some ideas and **missions!**

Every little thing each of you do, makes a huge collective difference. Encourage each other, be creative and have fun during your Net Zero journey!

Let the Environment & Climate Change team know how you get on during your missions by tweeting us @angusenvironews

Electricity

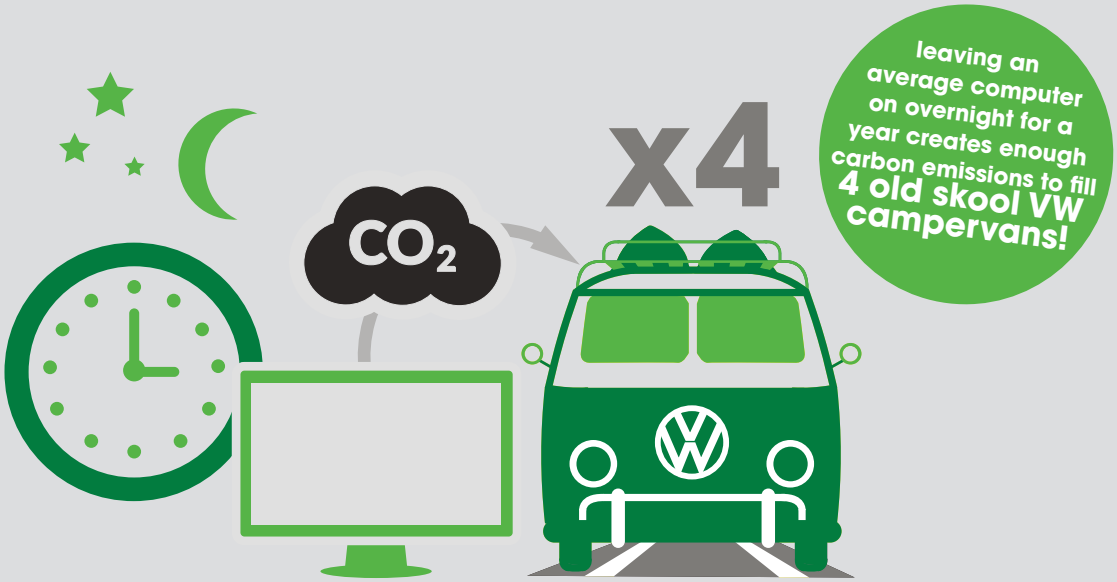
A big challenge to becoming Net Zero is **decarbonising** our electricity and fuels used for heating. Decarbonising means using renewable and low carbon fuel sources to heat and power our homes, schools and other buildings.

Check out this website for more information on what is renewable and non-renewable energy: https://www.bbc.co.uk/bitesize/topics/zp22pv4/articles/ztxwqty

The **Electricity** we use is becoming cleaner - in 2020, Scotland generated 97.4% of its electricity consumption from onshore and offshore wind, and hydro schemes. Although our electricity is almost decarbonised, we still need to use our electricity wisely - don't waste it!

Becoming Net Zero means we are going to start using more electricity for powering cars, trains and heat pumps in our homes, for example. This extra demand will put extra pressure on electricity generation and the electricity networks so we still need to **use electricity wisely at school, and at home.**

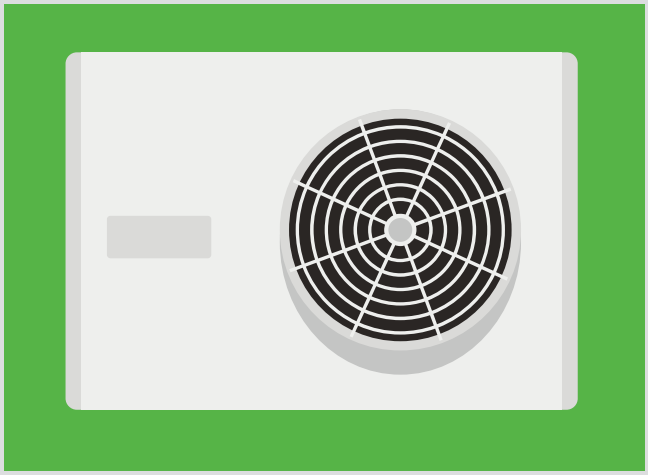
Did you know…



Heating

The biggest challenge of becoming Net Zero is decarbonising our heating. Currently gas is the main fuel for heating, but it produces carbon emissions. Engineers and other experts are looking into how Scotland can decarbonise its heating, a few examples are:

District heating - where a group of houses, a village or even a town get their heating from a central energy centre, rather than everyone having their own individual boilers.

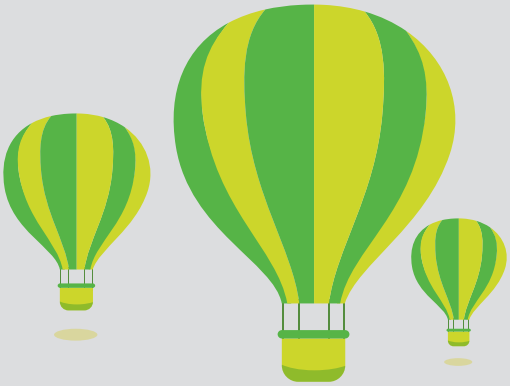


Heat pumps - using decarbonised electricity to power heat pumps to heat homes and buildings.

Hydrogen - produce green hydrogen on a large scale and use the existing gas network to transport it to heat schools, homes etc…

Unfortunately there's not much you can do about the fuel source used for heating at your school, but be assured there are a lot of people working to decarbonise it as soon as possible.

Did you know….



The suitable temperature for schools and most other building types is 20C. If an average school is heated to 22C (2C higher) then it creates enough excess carbon emission in a year to fill a hot air balloon!

Mission 1 - Become an Energy Expert

Research online - how do the following energy sources produce renewable and low carbon electricity or heat?

Solar

Wind

Hydro (Water)

Nuclear (what are the pros & cons?)

Biomass

Geo Thermal

Hydrogen (what is the difference between blue & green hydrogen?)

Carbon Capture & Storage

Mission 2 - Save Energy

Can you:

Check if the lights in rooms and cupboards are switched off when not in use?	
Switch the lights off during bright days?	
Ensure non-essential electrical items are switched off when not in use?	
Design posters to remind people to switch off lights and non- essential electrical items?	
Check the rooms are heated to the correct temperature of 20 deg C- are they being overheated?	
Check if heaters are blocked by furniture?	
Feel any draughts from windows and doors?	
Make your own draught excluders?	

If it's a warm day, make sure the radiators are switched off beforeopening windows.	
If it's a colder day, make sure your friends bring a cosy school jumper instead of turning the heating up.	
Could your school generate its own electricity - what ideas do you have?	

Ask your teacher to:

Look into installing sensors or timers to automatically switch lights, appliances or other items off?	
Look into buying more energy efficient items or appliances, when the current one breaks?	
Check if the heating is going off and on at the correct times?	
Check if the radiator valves are set correctly? Usually 3 or III equates to 20 deg C, the correct temperature for a room.	
Report any draughts and heating issues.	

Water

Water is a precious resource: although approx. 70% of the Earths surface is covered in water, less than 3% of the world's water is fresh (drinkable), and most of it is frozen in the Antarctica, Arctic and glaciers. Humans are misusing and polluting water faster than nature can recycle and purify water in rivers and lochs.

Due to climate change we are getting more extreme weather events such as flooding and storms, but droughts during the summer months are increasing in Scotland too.

Using water smartly can help ensure that we continue to have clean water to drink, wash and stay healthy.

Check out this YouTube clip from Scottish Water about the Water Cycle https://www.youtube.com/watch? v=yn4UJVO5cNQ

Learn about the history of water, how to look after it & our beautiful environment.

Did you know...

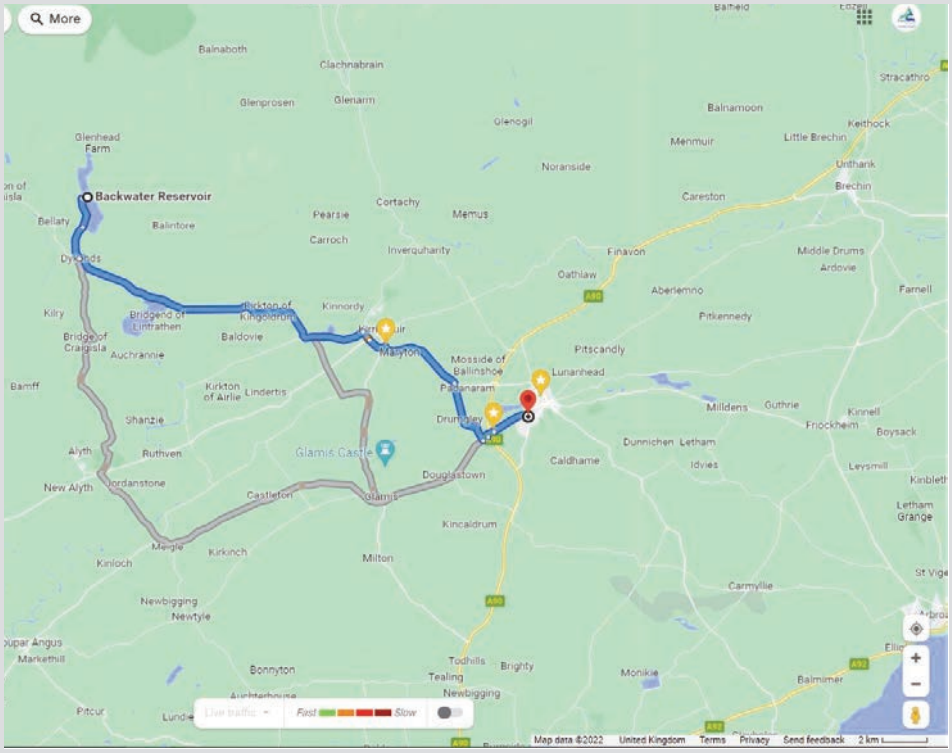
x2

Each person uses on average 165 litres of water per day - this roughly equates to 2 full baths worth of water!

In **Angus** our water comes from Backwater Reservoir and Lintrathen Reservoir.

Can you find your school on the map?

How far is your school from the reservoirs? Use Google Maps - directions tool to roughly calculate how far your school is from the reservoirs?



For example - the rough distance from Backwater Reservoir to Langlands Primary School is 17.4 miles

Scottish Water treat the water from the reservoirs and pump it to our homes and schools. They also treat all the waste water we generate. They use energy to supply water to our homes and schools, and to treat the waste water. To make sure our water is **Net Zero**, Scottish Water are working hard to **decarbonise** the energy they use - **check out** their website to find out more.
https://www.scottishwater.co.uk/About-Us/Energy-and-Sustainability/ Renewable-Energy-Technologies

Mission 3 - Become a Water Expert

Take a look at the Scottish Water **All about water** website, and complete the quiz below - https://www.scottishwater.co.uk/Help-and-Resources/Education/All-About-Water

1. How long does it take for a lack of rain or drought to lead to a water shortage?
2. What items do people wrongly flush down the toilet?
3. In rich countries , how much more water do people use compared to poor countries?
4. In the water cycle - where does water evaporate from?
5. True or False - the water we all use and drink today is the same water used by the dinosaurs?!
6. What is water called once it has been used?
7. What is surface water?
8. What can the sludge in stage 2 of the waste water treatment process be used for?
9. How much water should we drink in a typical day?
10. Today we use much more water than 70 years ago - why?
11. What are the dangers of swimming in cold water, such as reservoirs or rivers?
12. What are reservoirs, and where are they usually located?

Mission 4 - Save Water

Can you:

Become a **leak detective**... Make sure taps are fully closed with no drips or runs.Check for leaky loos!!! Can you see any water dribbles or runs inside the toilet pan?	
Make sure that push taps or sensor taps aren't running for longerthan needed	
Design a poster to remind you and your family to turn the tap off while you brush your teeth.	
Make sure the dishwasher and washing machine are full before its switched on.	
Have a shower rather than a bath, but keep the time in the shower short!	
Challenge your friends to a game of **'Pipeline Challenge'** !https://www.scottishwater.co.uk/Games/PipelineChallenge/index.html	

Ask your teacher or parent to:

Try to fill the kettle with only what is needed, this will save water and energy.	
Use the lid on saucepans to reduce the amount of water lost through evaporation. It also helps your lovely pasta and veg cook quicker!	
Install a water butt on a down pipe to collect rain water to water garden plants instead of using water from a tap.	
Use 'eco' settings on dishwashers and washing machines.	
Upgrade to water efficient dishwashers, washing machines, showerheads and toilets when the current one's need replaced.	

Water quiz answers

1 3 weeks

2 Nappies, Cotton buds, Cotton wool, Baby wipes, Razors, Paper towels, Nappy liners, Plasters, Cotton wool, Medicine/tablets, Sweet wrappers.

3 10 times more

4 Sea, lochs/lakes and rivers.

5 True

6 Waste Water

7 Rain water from the roads, roofs and gardens is known as surface water

8 Used to make the soil better (natural fertiliser) or for burning to make electricity

9 The Food Standards Agency advise that we take around 1.5 to 2 litres of water in a typical day. That's the same as 6 to 8 250ml glasses.

10 The quality of Scotland's drinking water is at an all-time high, water is piped direct- ly into our homes, we wash, shower or take baths more often, we have lots of hot water, washing machines and dishwashers use more water, gardens are watered with hoses or sprinklers, cars are washed.

11 The dangers of water include: Very cold temperatures, Hidden currents, It can be deep, It is difficult to estimate depth, There may be hidden rubbish like shopping trolleys or broken glass, It can be difficult to get out (steep slimy banks), No life- guards, Water pollution may make you ill.

12 Most of the water used today is collected and stored in man-made or natural lochs called reservoirs. Rainfall is highest in **hilly areas**, so this is where most reservoirs are. Reservoirs are made by building a dam across the upper part of a river. The water then collects and makes a huge loch.

Biodiversity

Biodiversity is the name we give to the variety of all life on Earth.

Check out this YouTube clip from the Natural History Museum which explains more about biodiversity:

What is biodiversity? | Natural History Museum - YouTube

How is biodiversity and net zero linked?

Our natural habitats like peatlands, native woodlands and oceans help lock in carbon emissions and reduce the amount of harmful gases that are emitted into the atmosphere. This helps us achieve the Net Zero balance, limit global temperatures and slow down climate change.

For more information on the carbon cycle, check out NASA Climate Kids website: Greenhouse Effect: Keeping the Balance | NASA Climate Kids

To achieve Net Zero by 2045 we need to create more **'carbon sinks'** that lock in carbon emissions by restoring peatlands and planting more tree's, for example. But, we have to **respect and enhance biodiversity** at the same time to protect our natural habitats and wildlife. It's a real balancing act!!!

Can you…

Research online how the following habitats help slow down climate change:

- **How much carbon is stored by all of Scotland's peatlands?**
- **How much carbon is absorbed by all UK ancient woodland?**

True or false...?

- **Peatlands store twice as much carbon as all the world's forests.**

Biodiversity - help your local wildlife

Wildlife relies on a healthy environment to survive.

Rising temperatures and extreme weather events such as droughts, wildfires and flooding cause changes in the habitats our native wildlife calls home.

One in ten species in the UK are at risk of extinction and over half of the UK wildlife is in decline.

As the climate changes, there are lots of ways we can all help our local wildlife as it struggles to adapt.

Check out the Scottish Wildlife Trust website to learn about our local wildlife. Discover. Learn. Play. | Learning Zone | Scottish Wildlife Trust
There is also a Wildlife Watch Group that meets once a month at the Montrose Basin.

Water is key to the existence of all wildlife. As our seasons become drier with less predictable rainfall, we can all help by providing **water for wildlife**.

Water is essential for wildlife to thrive, but it isn't just for drinking. Amphibians like newts, frogs and toads use water as shelter and breeding grounds. Butterflies get valuable minerals and salts from slightly muddy water, and birds use water to bathe and remove parasites.

Mission 5 - Help your local wildlife

Can you create:

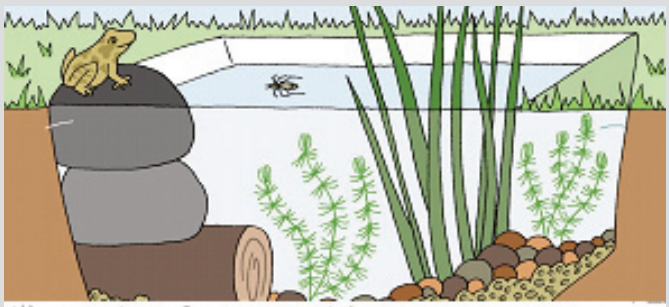
Butterfly puddles

Most butterflies feed on nectar, but did you know they also need water and minerals to stay hydrated and healthy? Butterflies can't land on open water, so some rely on shallow puddles and wet sand or soil to get the water, salts and minerals that they need.

You can help out by creating a simple **butterfly 'puddling station':**

- Use a shallow dish or saucer.
- Fill the dish with a mixture of gravel and small stones, sand and/or soil.
- Add enough water to saturate the soil/ sand but ensure that not all of the gravel/stones are underwater.

Container ponds



Even small containers such as an old washing up bowl can be recycled and turned into a pond to provide a lifeline for wildlife.

Follow the steps outlined by the Wildfowl and Wetland Trust and create a wildlife haven:

https://www.wwt.org.uk/discover-wetlands/gardening-for-wetlands/how-to-make-a-mini-wildlife-pond-from-an-upcycled-container/

Biodiversity answers

How much carbon is stored by all of Scotland's peatlands?
Scottish peatlands store 1.7 billion tonnes of carbon; this is equivalent to 140 years' worth of Scotland's total annual greenhouse gas emissions.

How much carbon is absorbed by all UK ancient woodland each year?
1.7 million tonnes carbon absorbed by UK ancient woodland every year.

True or false?

Peatlands store twice as much carbon as all the world's forests.

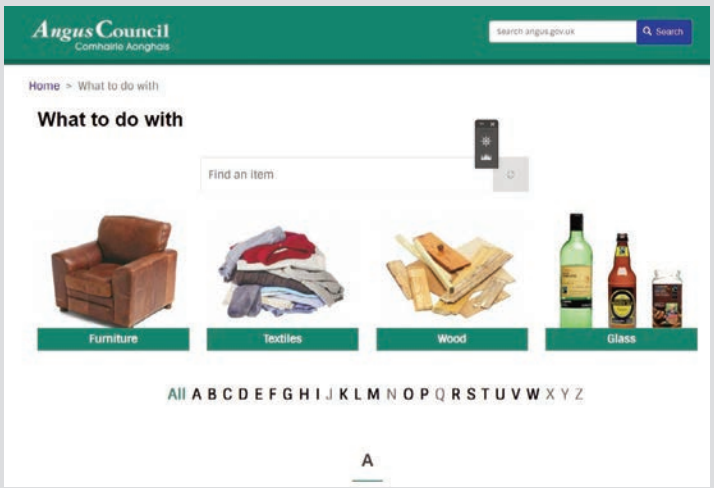
Answer: **TRUE**

Waste and recycling

Instead of throwing things away when we've finished with them, we can reuse or recycle them.

- Reusing and recycling cuts waste and reduces carbon emissions.
- Recycling means reprocessing waste into new things.
- Reusing means using things for as long as possible.

Most of the things we throw away can be recycled in your bins at school, home, or at a recycling centre. It's easy to recycle paper, cardboard, cans, glass bottles and jars, and plastic bottles and food containers by putting them in your grey mixed recycling bin, and food goes in your brown caddy. You can also recycle, textiles, garden waste, wood, electrical items, batteries plus many other things at council recycling centres.



Check out the Angus Council website to find out what happens to the waste you put in your grey, green, purple and wee brown bins! What happens to your waste | Angus Council

And, what to do with various items when they are no longer needed or broken.
What to do with | Angus Council

Did you know…

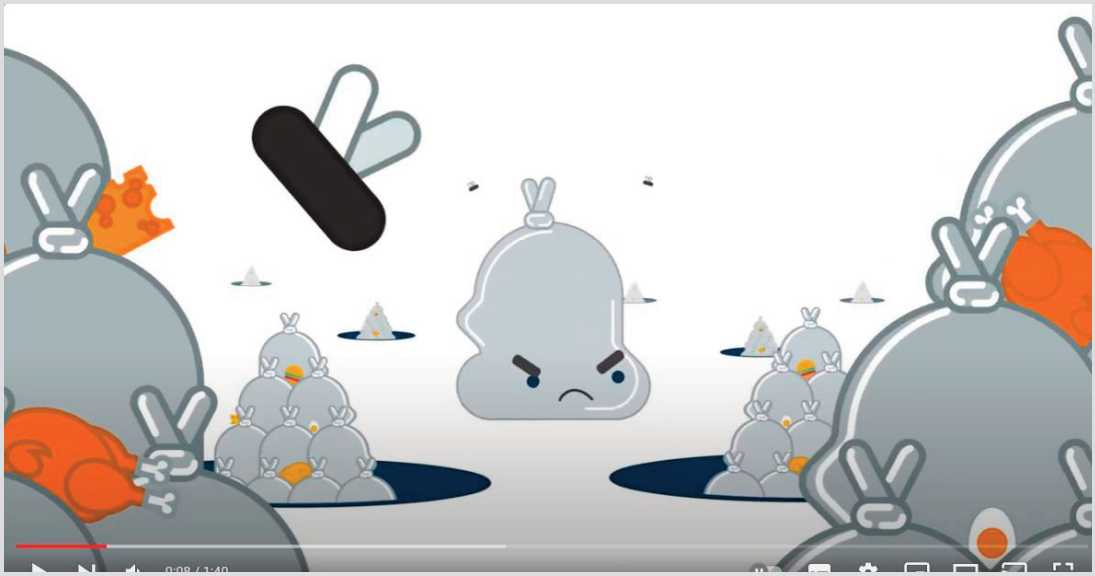
… that Angus is the number 1 recycling local authority in Scotland! Of the 52,166 tonnes of household waste generated in Angus during 2020, **30,266 tonnes** were recycled, a massive 57.9%!

This equates to the weight of 3 Eiffel Towers in Paris, France!

Reducing, reusing and recycling help us move towards a **circular economy** where materials are continually reused locally. In a circular economy as many objects as possible are repaired and reused, and when this isn't possible, they are recycled over and over again, meaning less waste and less carbon emissions.

Check out the National Geographic website to learn more about the circular economy and test your knowledge by completing the quiz:
All about the circular economy - National Geographic Kids (natgeokids.com)

Did you know that your **food waste** collected in the small brown bins is recycled into **fertiliser** for farmers fields and **biogas** for heating and electricity by a natural process called Anaerobic digestion?



Check out this You Tube clip to understand what happens to food waste: What happens to your food waste? | An- aerobic Digestion (AD) - YouTube

In preparation for your next mission:

- **Find out what waste is currently recycled at your school?**
- **Are there plenty of recycling bins located around the school for everyone to use?**
- **Is there already an eco-group or class tasked with reducing waste you can work with to help make a bigger difference?**

Mission 6 - Reduce, Reuse, Recycle

Create a mission board

Get together with your fellow **Waste Warriors** and think about how your school can move towards a circular economy by reducing, reusing and recycling.

Active travel and transport

Active Travel means making journeys by being physically active, for example walking, wheeling, scooting or cycling. It can reduce the amount of traffic around your school, meaning carbon emissions are reduced and the air is cleaner.

Active travel to school **wakes up the mind and body**! You can concentrate better, have more energy and become fitter. Active travel on the way home helps you to **unwind** after school by giving you time and space to think.

Check out this YouTube clip to find out more about Active Travel, then complete the activities below.
What is Active Travel - YouTube

Active Travel quiz

1 Active Travels uses your heart, legs and …..?

2 What daily activities can be done by Active Travel?

3 In Scotland what percentage of car journeys are under 3 miles?

4 True or False - Active Travel can boost your mental health?

5 Roughly how long does it take to travel 3 miles by bike?

Why choose active travel...

What are your reasons for choosing Active Travel?

Have a think back to your last few car journeys - where did you go, how far did you go, could you have travelled actively?

If active travel isn't possible and you get a bus or taxi to school, ask the bus or taxi company if they have any **Ultra Low Emission Vehicles (ULEVs)** that could be used on the school run instead.

ULEVs are vehicles that:

- use low carbon technologies such as electric or hydrogen, or
- emit very little emissions from their exhaust, such as hybrid vehicles.

Can you... use the internet to research ULEVs.

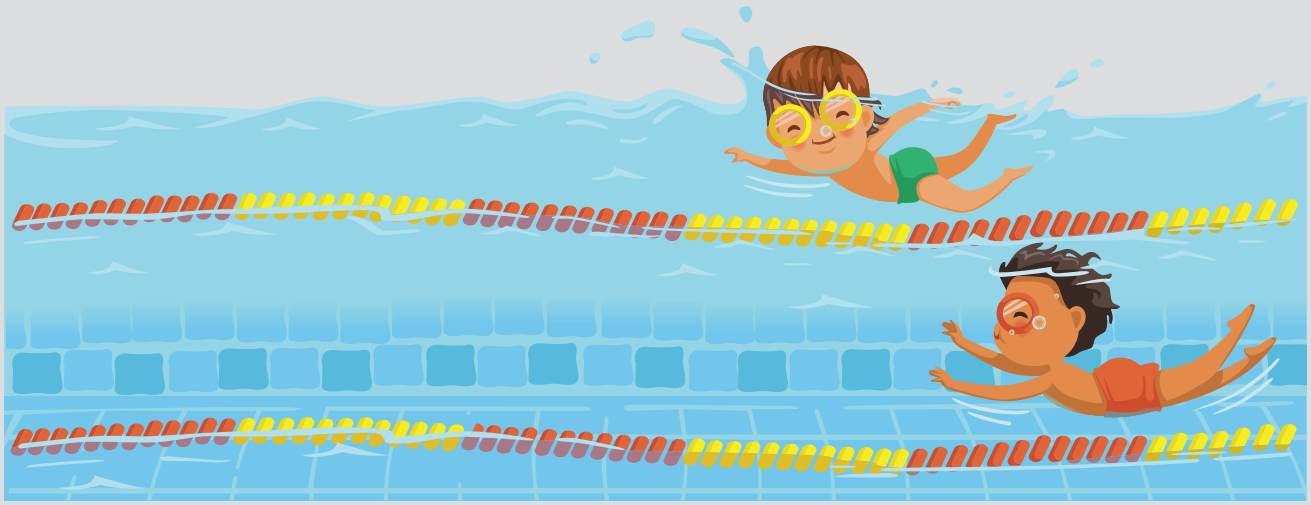
How do electric, hydrogen and hybrid vehicles work?

What are their differences?

Did you know....

... that each mile you walk rather than drive saves 276g of carbon emissions being released into the atmosphere - this volume of carbon emissions is the about the **same size as a fridge!**

If 50 classmates live a mile from your school and get driven to and from school for a year, the amount of carbon emissions released into the atmosphere could **fill an Olympic swimming pool!**



Mission 7 - Get Active!

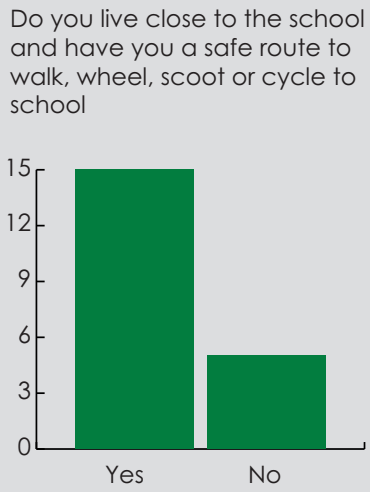
Carry out a travel survey to find out how your classmates travel to school.

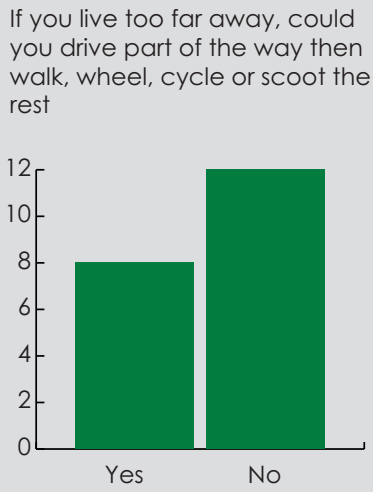
- Design a questionnaire to hand out to your classmates (or the whole school!).
- Ask your classmates to complete the questionnaire.
- Gather the results and use your maths skills to create graphs of the results.

Example Questions:

Do you live close to the school and have a safe route to walk, wheel, scoot or cycle to school? Yes / No

If you live too far away, could you drive part of the way then walk, wheel, cycle or scoot the rest? Yes / No





- From the results can you think of ways to increase Active Travel to and from your School?

Could you start **Wheelie Wednesdays** or **Free wheel Fridays?!** On this day everyone makes an effort to walk, wheel, scoot or cycle to school.

Get your friends involved, make it fun!

Active travel quiz answers

1 Active Travels uses your heart, legs and …..? **Lungs**

2 What daily activities can be done by Active Travel? **Travel to work, shopping, the school run, visiting friends.**

3 In Scotland what percentage of car journeys are under 3 miles? **50%**

4 True or False - Active Travel can boost your mental health? **True**

5 Roughly how long does it take to travel 3 miles by bike? **20 mins**

Teachers zone!

Check out these websites for more information on the topics discussed in this guide:

https://www.youngclimatewarriors.org/ https://www.eco-schools.org.uk/

https://climatekids.nasa.gov/menu/big-questions/
https://www.netzeronation.scot/resources/toolkits-quizzes
https://www.scottishwater.co.uk/help-and-resources/education

https://www.soilassociation.org/our-work-in-scotland/

https://www.wwf.org.uk/

https://www.recyclenow.com/

https://www.zerowastescotland.org.uk/content/circular-economy-education

https://www.westlothian.gov.uk/media/26770/Waste-Audit-Guide/pdf/Waste_Audit_and_Action_Plan_Print_Copy_A9151275.pdf?m=636706244300170000

https://www.sustrans.org.uk/our-blog/projects/2019/scotland/active-travel-resources-for-teachers-in-scotland/

https://www.livingstreets.org.uk/media/3561/family-walk-to-school-kit.pdf

https://www.cyclinghub.scot/mediaLibrary/other/english/2327.pdf

To keep up to date with Climate Change, Biodiversity and Sustainability in Angus, check out the Sustainable Angus website and our twitter feed.

Sustainable Angus: @angusenvironews

Environment & Climate Change Team
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