






NET ZERO

TEACHER / FACILITATOR PACK

Materials developed on behalf of the Royal Air Force to support Glasgow Science Centre Learning Lab.

Materials appropriate for P5 - P7 pupils.



 Lesson objective	To learn what Net zero means and how we reach it. To learn about how climate change is affecting our planet and how we can prevent this by reaching net zero.
 Duration	Approximate total duration of all activities in this resource pack: 1.5 hours. Indicative timings provided for each component.
 Context to set the scene for the session	Net zero means reaching the balance between the amount of greenhouse gas emitted into the atmosphere and the amount removed. Burning fossil fuels releases greenhouse gases into our atmosphere causing climate change and the planet to get warmer. This is causing more extreme weather. If the planet increases by 1.5 degrees people will be unable to grow food and will go hungry. To stop climate change scientists say we need to reach net zero emissions by replacing polluting technology with new, greener technology. We can remove polluting gases by planting trees that capture the gases. We need to achieve this balance to make a better future for everyone, where we power buildings with green energy and drive environmentally friendly cars.



Scottish curriculum links

This activity provides links to experience and outcomes in a number of subject areas covered by Curriculum for Excellence. Specifically, these include:

Through carrying out practical activities and investigations, I can show how plants have benefited society. **SCN 2-02b (Biodiversity and interdependence)**

By considering examples where energy is conserved, I can identify the energy source, how it is transferred and ways of reducing wasted energy. **SCN 2-04a (Energy sources and sustainability)**

Through exploring non-renewable energy sources, I can describe how they are used in Scotland today and express an informed view on the implications for their future use. **SCN 2-04b (Energy sources and sustainability)**

Through research and discussion, I have an appreciation of the contribution that individuals are making to scientific discovery and invention and the impact this has made on society. **SCN 2-20a (Topical science)**

I can report and comment on current scientific news items to develop my knowledge and understanding of topical science. **SCN 2-20b (Topical science)**

I can analyse how lifestyles can impact on the environment and Earth's resources and can make suggestions about how to live in a more sustainable way. **TCH 2-06a (Impact, contribution, and relationship of technologies on business, the economy, politics, and the environment)**








I can make suggestions as to how individuals and organisations may use technologies to support sustainability and reduce the impact on our environment. **TCH 2-07a (Impact, contribution, and relationship of technologies on business, the economy, politics, and the environment)**

I can extend and enhance my design skills to solve problems and can construct models. **TCH 2-09a (Design and constructing models/product)**

I understand how scientific and technological developments have contributed to changes in everyday products. **TCH 3-05a (Awareness of technological developments (Past, Present and Future), including how they work)**



Pupil resources

-  Introductory explainer
-  Net Zero Factsheet
-  Worksheet: Definitions
-  Worksheet: Net Zero wordsearch
-  Worksheet: Net Zero means balance
-  Worksheet: Design a Net Zero village
-  Worksheet: Net Zero quiz



Hook into the lesson (10 mins)

Play  **INTRODUCTORY EXPLAINER.**

Additional context

Net zero means reaching the balance between the amount of greenhouse gas emitted into the atmosphere and the amount removed. Greenhouse gases are mainly caused by burning fossil fuels such as coal, oil and gas.


Releasing greenhouse gases into our atmosphere is causing climate change and the planet to get warmer.

To stop climate change scientists say we need to reach net zero emissions by replacing polluting technology with new, greener technology. We can remove polluting gases by planting trees that capture the gases.

We can reduce our carbon footprint by following the 5 R's – Refuse, Reduce, Reuse, Rot, Recycle.


We need to achieve net zero by powering buildings with green energy, eating less meat and using environmentally friendly fuels.


Scotland is aiming to become the first UK nation to reach Net Zero by 2045.

Provide pupils with a copy of  **Net Zero FACTSHEET.**



Activity (10 mins)

 Ask pupils to think of some good ways to reach net zero (e.g. Planting more trees, Solar energy, Electricity, Wind power, New green technology, Biofuels)

Lead a discussion with pupils that explores some of the key terms used when discussing Net Zero. Provide pupils with  **Worksheet: DEFINITIONS.** (Answers: Carbon footprint = A, Recycle = E, Food Miles = B, Sustainable Fuel = C, Upcycle = D, Emissions = F)



Activity
(25 mins)

? Ask pupils to think of some bad things that are contributing to climate change (e.g. Burning fossil fuels like oil, gas and coal, Old technology, Emitting greenhouse gases, Cutting down forests)

Provide pupils with a copy of [Worksheet: NET ZERO WORDSEARCH.](#)



Provide pupils with a copy of [Worksheet: NET ZERO MEANS BALANCE.](#)



Activity
(25 mins)

? Ask pupils to think about the carbon footprint caused by taking a trip to the supermarket. (e.g. Car journey, staff travel to work, food miles, heating and lighting of supermarket building etc.)

Provide pupils with a copy of [Worksheet: DESIGN A NET ZERO VILLAGE.](#)

**Activity
(20 mins)**

? Ask pupils to name the 5 R's for reducing their carbon footprint:

REFUSE: Say no thank you to single-use plastics.

REDUCE: Just buy what you really need.

REUSE: Keep your things in great condition and repair or upcycle it when it breaks.

ROT: Set up a compost heap for your food scraps or put them in the food recycle bin.

RECYCLE: Recycle any plastic, paper, glass or metal.

Provide pupils with a copy of [Worksheet: NET ZERO QUIZ](#).

ANSWERS:

Q1: What do we mean by net zero?

A: Reaching the balance between greenhouse gas emitted and gas removed.

Q2: What is climate change?

A: Our planet heating up.

Q3: Choose three of these which are helpful for reducing our carbon footprint

A: Recycle, Reuse, Rot.

Q4: What is solar power?

A: Power from the sun's rays.

Q5: When does Scotland want to reach net zero?

A: 2045.

Q6: By what year does the RAF want to power their aircraft with sustainable fuels?

A: 2050.

Q7: What does drought mean?

A: Serious shortage of water.

Q8: How many hectares of trees does the Forestry Commission want to plant by 2050?

A: 1 million.

Q9: Which of these contribute to damaging our climate? (Choose more than one)

A: Burning fossil fuels, Running power stations.

Q10: What is greenhouse gas?

A: Gas that lets sunlight pass through to earth, but prevents the heat from leaving the atmosphere.



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CONTEXT AND EXAMPLES

More [information](#) about the five ways to reduce your carbon footprint.



REDUCE YOUR CARBON FOOTPRINT

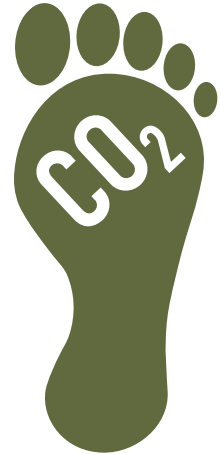
REFUSE: Say no thank you to single-use plastics.

REDUCE: Just buy what you really need.

REUSE: Keep your things in great condition and repair or upcycle it when it breaks.

ROT: Set up a compost heap for your food scraps or put them in the food recycle bin.

RECYCLE: Recycle any plastic, paper, glass or metal.



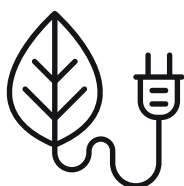
SCOTLAND AND NET ZERO

Scotland is aiming to become the first UK nation to reach Net Zero by 2045.

Scotland's greenhouse gas emissions fell by 31% from 2008 to 2018. This is faster than any other nation of the UK and any G20 nation over the same period.

Scottish renewable energy use has tripled, and fossil-fuel use has fallen by more than 70% in the last decade.

The G20 (Group of 20) comprises 19 countries and the European Union. The 19 countries are Argentina, Australia, Brazil, Canada, China, Germany, France, India, Indonesia, Italy, Japan, Mexico, Russia, Saudi Arabia, South Africa, South Korea, Turkey, the United Kingdom and the United States.



[Read more](#) about Scotland's plans for Net Zero.





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CONTEXT AND EXAMPLES



ROYAL AIR FORCE

RAF AND NET ZERO

To reach net zero the RAF are planning to use sustainable biofuels by 2050 in their fighter jets and helicopters. The aircrafts will be powered by fats and oils, wood waste, household waste, organic matter and seaweed.

More information on [Future Net Zero](#) website.



Forestry Commission

FORESTRY COMMISSION - REACHING NET ZERO

The [forestry commission](#) is the government department responsible for protecting and expanding the sustainable management of woodlands. They are committed by law to reach net zero emissions by 2050. To do this they need to plant more trees urgently. They are aiming to plant a million hectares of new woodland in the UK by 2050. That is a lot of trees. If it were all in one place (which of course it won't be) that would mean a new forest the size of Norfolk and Suffolk together.



LEAD POLLUTION

Lead was once added to petrol. But scientists found out that it caused air pollution and made people very poorly. Small amounts of lead could also be absorbed by plants and trees, but it was decided to stop using lead for safety purposes.

Net Zero [YouTube video](#) outlining the issues from a child's perspective.

