

The Spark

Magazine

PUZZLES, QUIZZES, OUTDOOR LEARNING



ISSUE
No7

**BUILD A
WIND TURBINE**

**DESIGN
YOUR FUTURE
TRANSPORT**

**MEET AN
APPRENTICE
TECHNICIAN**

With support from the Inspiring Science Fund provided by BEIS, UKRI and Wellcome. Powering The Future Week on #GSCAtHome is supported by OPITO.



GLASGOW
**SCIENCE
CENTRE!**

Inside

This issue

GSC at Home Presents
**POWERING
THE FUTURE**

WELCOME

Welcome to this special edition of The Spark where we are focusing on energy to celebrate Powering the Future Week!

There are exciting experiments for you to try at home, fascinating facts to ponder over, and puzzles and quizzes to challenge your family – all looking at how we power our planet.

This week we will be meeting apprentice technician Rebecca Rieley, building a wind turbine and you can even join our top secret mission to design a renewable energy vehicle. How would you design the dream vehicle of the future?

You can watch our energy-themed videos that go along with the experiments on the Glasgow Science Centre Facebook page or YouTube channel.

Best wishes,
Glasgow Science Centre

Power-up your future with energy and find out even more about it - whizz over to [OurFuture.Energy](https://ourfuture.energy) (<https://ourfuture.energy>)



SHARE YOUR PICS WITH US



If you try any of our activities this week, please show us how they turned out. Send your favourite pictures to contact.us@gsc.org.uk or share with us on our social media channels with #GSCAtHome. We'll print a selection of your pictures in the next magazine.

Share on social #GSCAtHome
email to contact.us@gsc.org.uk



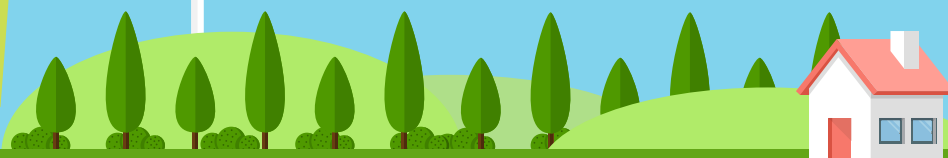
WIND TURBINE WORDSEARCH

Help the wind turbine provide energy to our house. Use the words in the wordsearch to connect the turbine to the house. The "wire" of words can run up, down, left, right, or diagonally. The last letter of each word is the first letter of the next one.

Wind turbine
Solar
Electric
Energy
Renewable
Coals



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





FAMILY QUIZ

All questions linked to activities in this issue

Answers on
back page

DID YOU
KNOW?

The UK's largest onshore windfarm is only 20 miles from Glasgow! Whitelee Windfarm has 215 turbines...

... which provide enough energy to power 300,000 homes a year.

QUESTIONS

1. What is the scientific phrase for movement energy?
2. What are the three things that make up "The Fire Triangle" - everything you need to make a fire?
3. True or false: Energy can't be created or destroyed, it can only be transformed from one type of energy to another.
4. A portion of chicken nuggets contains enough energy to keep a ballet dancer dancing for how long? a) less than five minutes b) about one hour c) over three hours d) more than six hours
5. True or false: Batteries turn electrical energy into chemical energy.
6. Batteries come in many shapes and sizes to suit a range of jobs, with batteries like the AA or AAA powering everything from TV remotes to radios. But by what name is the E or E-block battery better known?
7. True or false: NASA's Juno spacecraft harnesses solar power to keep it in orbit around the planet of Jupiter.
8. What two-word term starting with the letter "F", describes energy sources such as oil, coal and gas, which originate from the remains of organic matter.
9. The Curiosity rover, currently exploring the Gale Crater on Mars, gets its energy from nuclear power. How long is this power source predicted to last before it runs out? a) up to one year b) up to six years c) up to fourteen years d) up to twenty-two years
10. True or false: Energy is measured in Watts, named for the Scottish inventor James Watt.

I'M AN... APPRENTICE TECHNICIAN

HINT

You may find some answers throughout this magazine or in our #GSCatHome videos.

Meet Rebecca Rieley

an apprentice oil and gas process technician with OPITO. Technicians operate equipment and systems which process oil or gas.

"I am currently an apprentice, training in the hopes of going offshore to work. At the moment I am attending college Monday-Wednesday and working on practical skills on a Thursday and Friday which is all related to my role as a process technician. The apprenticeship I am doing now is the perfect opportunity for me as it combines practical and theoretical knowledge in order to prepare me for my role in the oil and gas industry. The favourite thing about my job is the practical side. Being in the workshop and seeing a completed project is very rewarding, as well as working as a team and helping colleagues out within the workshop. At a young age I was very practical and hands on, I would love to be outside helping my dad fix bikes and cars. I loved helping him complete projects and learn how to do all these things. He taught me to look at situations and choose the best way to tackle them, which is a great skill to have in my current role."

Hobbies: I really enjoy cycling and swimming.

Favourite Food: Thai food.



ACTIVITY

GSC at Home Presents

POWERING
THE FUTURE



Make Your Own Wind Turbine

What will you do?

It wouldn't be Powering the Future Week without talking about wind turbines. Found all over Scotland, wind turbines are an amazing and environmentally friendly part of the solution to our energy needs. Grab a short list of household supplies and follow along as we build a wind turbine of our very own! **Make sure you have adult supervision before starting.**

What will you need?

Blue tack

Glue

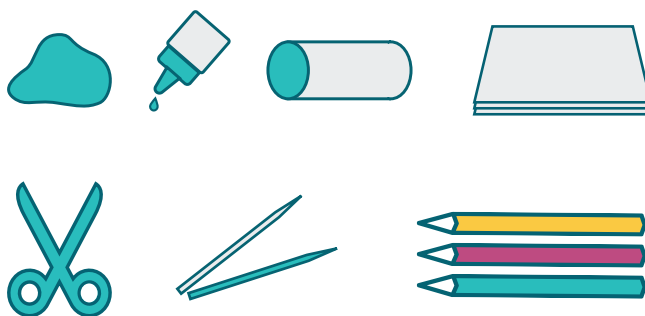
Toilet/kitchen roll tube

Paper

Scissors

Toothpick

Coloured pencils / crayons / paint



How to build your own wind turbine

Step 1. Take your colouring pen, pencil or paint and colour in your toilet/kitchen roll tube. This is going to be the tower of your wind turbine.

Step 2. On a piece of paper, draw three blades for your wind turbine (these should be roughly triangular in shape), and a small circle just larger than a two pence piece. Then, with an adult's help, use the scissors to cut these shapes out.

Step 3. Take your three blades, and arrange them so that the bottom of the blades overlap, while the tips point out in three different evenly spaced directions, just like you might find on a desk fan or as in the petals of a flower. Using the glue, stick them together like this, one on top of the other, before finally sticking your circle shape centred on top.

Step 4. Once the glue has dried, colour in and decorate your blades.

Step 5. Roll a small ball of blue tack and place it on a table. Then take your decorated blades and place them down on top so that the centre of your circle shape is over the blue tack. Then with the help of an adult, take the toothpick and carefully push the point through the very centre of the circle so that it pierces through to the blue tack underneath. Remove the toothpick and blue tack from the blades.

Step 6. Now take the ball of blue tack and stick it to the inside wall of the decorated tube from Step 1, about two centimetres down from the top. With the help of an adult push the toothpick through the outside wall until it pierces the blue tack.

Step 7. Do not remove the blue tack and toothpick, instead continue to slowly push the toothpick until it pins the blue tack against the opposite wall. You should end up with the toothpick sticking out the front of the tube, while its other end is stuck with the blue tack to the inside wall opposite the hole.

Step 8. Ask your adult to use the scissors to cut the section of toothpick sticking out of the front of the tube, so that it only protrudes by a couple of centimetres.

Step 9. Take the decorated blades and a sharp pencil. With the help of an adult gently widen the hole in the centre of the blades slightly, before threading the blades over the section of toothpick sticking out of the front of the decorated tube.

Step 10. Roll a small ball of blue tack and place it on the end of the toothpick so that the blades cannot fall off

Step 11. You've made your very own wind turbine! Place it upright on a desk and use your fingers to spin the blades. This spinning is an example of kinetic energy or movement energy. On a windy day, spinning wind turbines can help to power everything from our TVs, to our fridges, and even electric cars!

More to try

Once you've built a beautiful wind turbine, why stop there? Here's just a few of our suggestions:

Make different shaped blades - which ones spin the best?

Make bigger blades - could these catch more wind?

Build more wind turbines and make your very own wind farm!

Fun facts

Wind turbines make electricity from wind energy. Wind is a renewable energy source, meaning it occurs naturally and will never run out!

The Haliade-X 12 MW wind turbine is the most powerful offshore wind turbine in the world. At 260m tall, it is twice the size of Glasgow Tower, and the height of around 2200 toilet roll tubes.

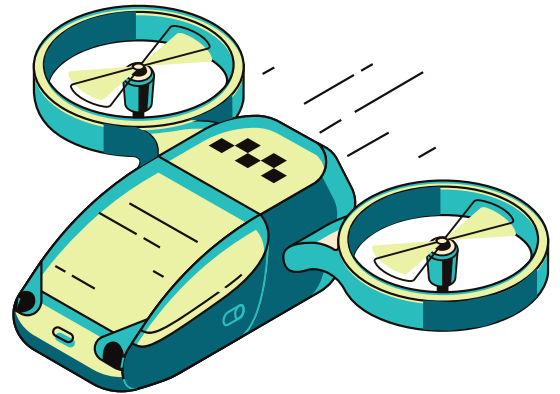
Scotland lays claim to the first wind turbine built for generating electricity, created by James Blyth in 1887 while a professor at Anderson's College (now Strathclyde University).



Send your pics to
contact.us@gsc.org.uk or share
with us on social #GSCAtHome

ACTIVITY

Future Transport



What will you do?

In this activity you will create a brand-new type of transport that uses renewable energy instead of burning fossil fuels that are harmful to our planet.

Ensure you have permission from an adult and their supervision before starting.

What will you need?

Paper

Colouring pens / pencils



How to do this experiment

Step 1. First you need to plan your amazing design and make sure it meets its purpose by thinking about some important features of your vehicle and writing down your answers to these questions:

- How many people will it transport? Will this affect how big or small it needs to be?
- How quickly does it need to travel? Does this affect how heavy it can be or what it's made of?
- Will it move through the air, sea or on land?

Step 2. Next you need to decide how your new vehicle will get its energy to move. Instead of using fossil fuels, that are bad for our planet when burned, we'll use renewable energy. Renewable energy comes from resources on our planet that won't run out when we use them, like wind or sunlight.

Which type of renewable energy would be best for your vehicle?

- Solar power, where we use solar panels to create electricity from the sun.
- Wind, that can spin huge turbines to create electricity.
- Water, where the waves and tides move turbines under the sea to make electricity.
- Geothermal energy, where steam made by the hot molten rocks under the surface of our planet is used to spin a generator which makes electricity.

Fun fact - this is the same energy that powers volcanoes when they erupt!

Step 3. Now it's time draw your brand-new vehicle. Make it as colourful and imaginative as you like. Add notes to your drawing to explain what each part of the vehicle does and why you chose it.

Hint: you might need to think about your answers to the questions above.

More to try

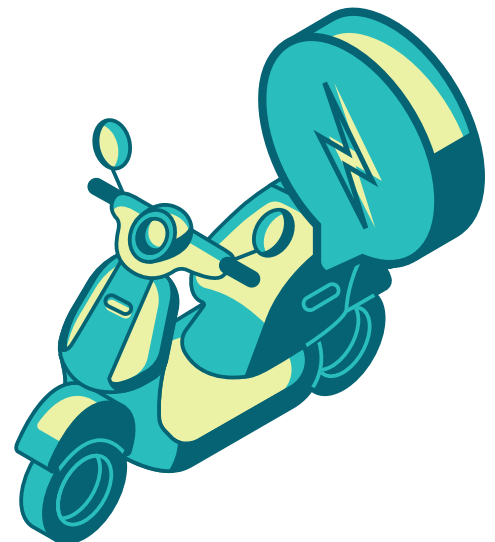
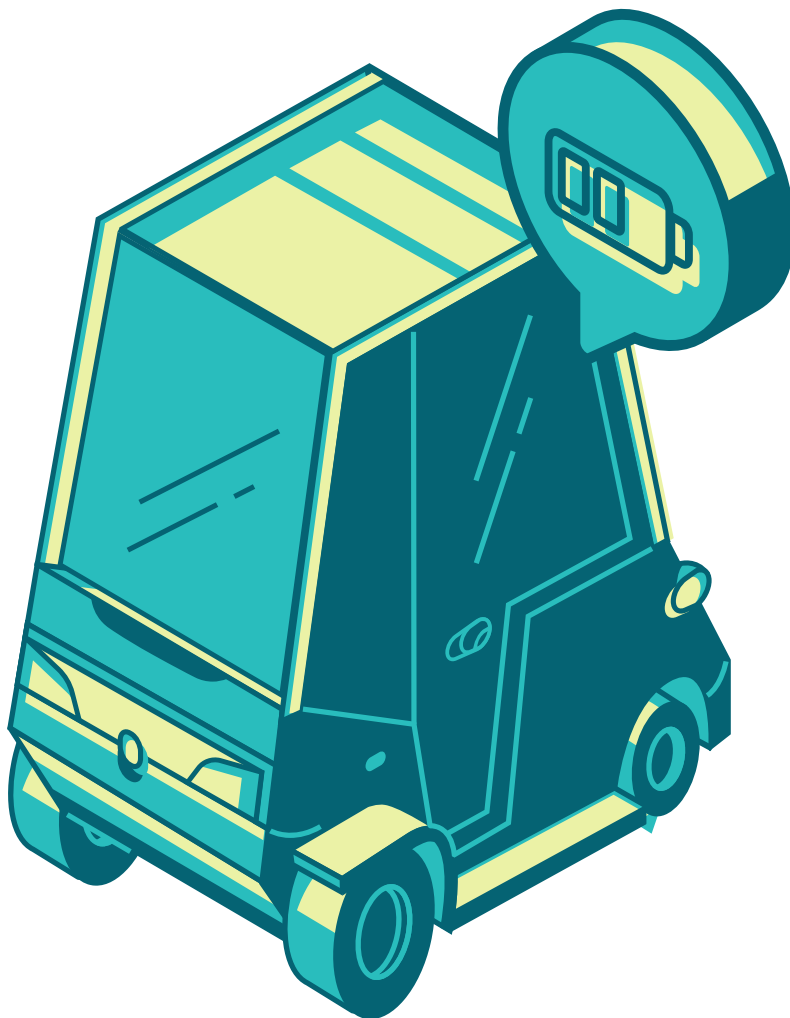
Try making a 3D model of your vehicle using items from your household recycling.

Head outside on a walk with an adult and look for signs of renewable energy like solar panels, wind turbines and charging points for electric vehicles.

Fun facts

The water wheel is one of the oldest inventions to make power and it's totally renewable! It uses falling water to turn a huge wheel which creates power for all sorts of machinery. Water wheels have been used to make lots of things like flour, paper and roads!

NASA uses solar power for some spacecraft, like satellites orbiting Earth and Jupiter, and rovers that have explored Mars. The electricity generated by the solar panels is stored in a battery so the spacecraft can work even when it's not facing the sun.



Send your pics to contact.us@gsc.org.uk or share with us on social #GSCAtHome

ABOUT US

Glasgow Science Centre is a 5-star visitor attraction located beside the River Clyde. We are home to hundreds of interactive exhibits where you can discover how the world works. Explore the inner workings of the human body, find out how we can power the future, challenge your family and friends to solve puzzles, explore technologies of the future and marvel at the wonders of the solar system under our full dome Planetarium. Our team of passionate presenters are always on hand to bring you exciting experiences in our hands-on workshops and live demos in our spectacular Science Show Theatre.

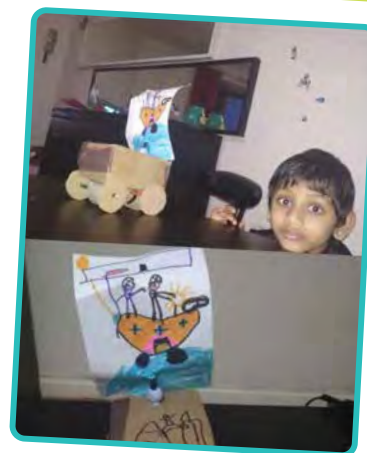
During these challenging times while we are unable to open our doors to you, we are bringing you the excitement of Glasgow Science Centre through GSC At Home. We're online every morning at 10am on our Facebook page and YouTube channel.

QUIZ ANSWERS

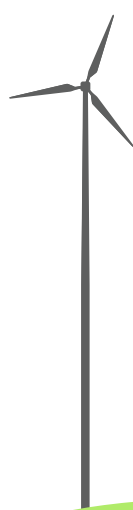


1. Kinetic energy is movement energy - the energy an object has when it is in motion.
2. Oxygen, fuel and heat are needed to create fire.
3. True. When we generate electricity, we're not creating new energy, but rather changing it from one form to another. For example, solar panels convert light energy from the sun, into electrical energy we can use in our homes.
4. b) Six chicken nuggets contain over a thousand kilojoules of energy – enough to dance for about 60 minutes!
5. False. It's the other way round - batteries transfer their chemical energy into electrical energy when they are placed in an electric circuit.
6. The E-block battery is better known as the 9 Volt battery.
7. True. Though it is now a whopping 770 million kilometers away from our Sun, the Juno spacecraft is equipped with 18,698 solar cells which provide it with the energy it needs to continue its mission.
8. Fossil Fuels – they are non-renewable, which means they will run out one day.
9. c) To achieve this, the Curiosity rover carries around 5kg of plutonium-238!
10. False. Power is measured in Watts. Energy is measured in Joules, named for the English physicist, James Prescott Joule.

YOUR PICS



WORDSEARCH ANSWERS



W	A	S	H	Q	R	G	H	X	Z	L	P	K	Q	U	C	F	S	A	I
O	I	E	D	V	N	H	P	I	Y	G	F	X	V	W	R	U	T	F	C
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WE WANT YOUR FEEDBACK



We would love to hear what you think!

We hope you liked this issue, but if you didn't, what should we change? What other things would you like to see or what topics are you most interested in? Don't forget to send us photos of your creations, discoveries and experiments. **Send your favourite pictures to contact.us@gsc.org.uk or share with us on our social media channels with #GSCAtHome.** We'll print a selection of your pictures in the magazine.

KEEP IN TOUCH



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