

Pioneers Energy challenge



Resource guide

The aim of Little Inventors resources is to allow young people to express the far reaches of their imagination and to inspire them to think up and draw original, ingenious, funny, fantastical or perfectly practical invention ideas. There are no limits!

Little Inventors is delighted to launch the **Pioneers programme** to invite young people aged 8-12 across Northumberland, Tees Valley and Sunderland to take part in the Energy Challenge. These resources have been designed to offer thought-provoking ways to support energy teaching in a cross-curricular approach which can be delivered as a topic across subjects such as Literacy, Science, Art, Design, or Citizenship.

They should be in upper KS2 or lower KS3 to enter. Other young people (both in age and location) are welcome to participate but will not be eligible for the Pioneers programme. You can see full terms and conditions on our website.

Young people can draw and submit their own inventions on our dedicated Little Inventors microsite pioneers.littleinventors.org, where they will be reviewed by the Little Inventors team! Their idea might even be chosen as team favourite, turned into an animation or even made into a real object that will be shown in a special exhibition in Tees Valley in summer 2020. That's not all: the 15 young people whose invention is chosen to be made real will also be invited with their teachers to take part in our exclusive Pioneers programme, where they will work with the Little Inventors team, professional makers and designers to turn their invention from idea to reality! You can find full Terms and Conditions on the website.

Familiarise yourself with the resources available before using them. Start by downloading the challenge resource pack.

Energy Challenge presentation

Use this presentation on a whiteboard or computer to support you while delivering the workshop.

Sources of energy presentation

Use this presentation to give an introduction to your young people about non-renewable and renewable sources of energy (optional).

Printed materials

Activity sheet: My energy day
Activity sheet: Natural vs processed
Invention sheet: Draw your invention

For teachers/ workshop leaders:

Curriculum links

Tools or materials needed during the session

Make sure you have plenty of black pens and colouring pens available.



Using the resources

This guide suggests how you might want to use the Little Inventors resources to run a structured workshop over a single or double lesson. Customisable and extended activities are also provided to enable all young people to make the most of the resources.

You may want to use this as a way to complement your lessons on energy - the more young people know about the topic before they do their invention, the better!

Get started!: Understanding energy (15 mins)

Explain that in this challenge, young people will get to think about the importance of energy and how it affects climate change. Explain that to take care of our planet, scientists agree that it is really important that humans change the way we do things and that energy is one of the most important things we can think about to really make a difference. Explain that in this challenge, they will explore what energy is, why it matters, find out about our human history with energy before thinking about better ways to make, use, store or stop wasting energy.

Open the Energy Challenge presentation and go through the slides with your class:

- Slide 2 introduces Little Inventors and Arthur, who is one of our little inventors from Stockton.
- Slide 3 is a video featuring Little Inventor Arthur, 8 from Stockton, setting the challenge!
- Slide 4 introduces the Little Inventors Pioneers programme.
- Slide 5 showcases why the North of England has a long history of energy and invention.
- Slide 6 explains why energy production and use is crucial to climate change and sets out the challenge for young people.
- Slide 7 gives examples of energy in everyday life.
- Slide 8 looks at energy within ourselves.
- Slide 9 focuses on the energy journey of food.
- Slide 10-13 summarises the history of energy and humanity, past, present and future.
- Slide 14 introduces the invention process.
- Slide 15 focuses on inventing simple machines to generate energy from motion.
- Slide 16 concentrates on inventing ideas to change our daily energy behaviour.
- Slide 17 encourages them to explore the full potential of renewable energy in novel ways.
- Slide 18 shows the drawing sheet and activities to work from.
- Slide 19 gives guidance on how to upload the invention to the website.

As an option, you could also use the Sources of energy presentation to discuss the importance of renewable energy.

- Slide 2 Non-renewable vs Renewable
- Slide 3 Fossil fuels: oil, gas and coal
- Slide 4 Nuclear power
- Slide 5 Water, wind and sun
- Slide 6 Wood and volcanoes
- Slide 7 Discuss new ways to generate energy!

Have a class discussion on energy, climate change and inventing, for example:

On inventing:

- What is an invention?
- Can you name some well-known inventions?
- What about ordinary objects? Why were they invented?
- Inventions are used to solve problems - can you think about problems or things around you which could be helped by an invention?
- Think of an everyday object, try to imagine how someone invented it!

On climate change and energy

- What do you know about climate change?
- Why do we need to care for our planet?
- Can you name some sources of energy?
- When do you use energy?
- How do you get energy?
- Can you think of the closest power plant near you, and what type it is?
- Can you think of something that doesn't use energy? (not really!)
- What are renewable sources of energy
- Why are they better for the environment?

Activity sheet: My energy day

Energy is such a large topic that it can be useful to go back to relatable daily activities to think about how energy is present throughout our lives (e.g. lighting, heating, transport, screen time, cooking, how often you use utensils, clothes, appliances, etc...). On this activity sheet, young people can draw four things they do every day and how this relates to energy use, think about how to use less or change their energy behaviour, and think of inventions that can help. You could prompt young people to think about distinct activities done at different times of the day such as being in class, playtime, on the way to school or what they do in the evening.

Differentiation: Instead of describing four activities, young people could draw one activity only.

Extension activity: You could ask young people to think of and describe (in drawing and writing) alternative ways to generate enough electricity to charge a phone on the go (e.g. through physical activities such as cycling or skipping, or using mechanical strength). They could research the information for more accurate results.



Activity sheet: from natural to processed

This activity will get young people thinking about the steps involved in producing objects and to understand that each step in the process uses energy, so the more steps there are, the more energy is used to create the object. Can they think of alternatives to the objects, or how to make it more efficient?

You could also show them videos of how paper, rubber bands or toothpicks are made on YouTube. Young people can write or draw the objects on the sheet on the line, from the most natural to the most processed.

Ask the young people how many steps they think is involved in making some of the objects.

Get them to do the activity then discuss the answers - is it what they expected? Relevant external links are included here to support the answers.

- tree (natural)
- wooden bench (wood is cut, assembled and treated) - <https://www.instructables.com/id/simple-bench/> (making site with tutorials)
- paper (wood is pulped, beaten, shaped and dried) - <https://www.explainthatstuff.com/papermaking.html> and <https://www.bbc.com/teach/class-clips-video/science-ks1-ks2-how-is-paper-made/zryb92p>
- cardboard box (recycled paper is often used, pulped, fluted and assembled) <https://www.themanufacturer.com/articles/how-a-cardboard-box-is-made/>
- toothpicks (wood is turned into a log, stripped, cut, dried, and polished) <https://www.youtube.com/watch?v=yCTkoiLjdfI>
- rubber bands (rubber is harvested, combined with acid, pressed, flattened, cured and sliced) <https://www.youtube.com/watch?v=aEIAYBGRyYY>
- pencil (the wood is cut and waxed, graphite is formed and pressed, graphite added to the wood blocks, then shaped, then finished) <https://www.youtube.com/watch?v=qqs3fxfmWr4>
- chewing gum (harvested, boiled, ground, mixed, dried, cooked, purified, flavour and sweetener added, kneaded, rolled, cut, seasoned and packaged - see <http://www.madehow.com/Volume-1/Chewing-Gum.html>).

Differentiation: young people create a drawing of one of the objects on the sheet and label it to show what they think has gone into making it.

Extension activity: Get young people to research individual objects and share their findings with the rest of the class and compare it to what they initially thought. They could also explore other raw materials, such as fish, which can be used to make bandages, ink, shoes and even glasses and make their own graph.



Drawing sheet: My invention!

Once young people have had a chance to develop their ideas a little through discussion and their chosen activities, give them a drawing sheet to draw and explain their invention.

Make sure that young people put their name and age on the worksheet. First, ask them to draw using a black pen as an outline and add colour to their invention to bring it to life. Ask them to label parts on their drawing to explain how it works.

Ask young people to name and explain their invention in writing - what does it do? Who is it for? What made them think of it?

Young people can draw more than one invention if they have time.

Differentiation: young people make a video or audio recording to explain how they came up with their idea, in their own words.

Extension activities: young people could research the materials required for their invention, what their properties are and review their invention idea to see how this information might change their design.

Round-up: (5-15 mins)

Ask young people to reflect on their inventions and discuss them with a partner as noted on the slide. Gather all the student invention drawings in a gallery around the classroom/ workspace.

Get young people to discuss their favourite ideas — what do they like and why? Encourage positive feedback throughout.

- What do they think of their invention?
- What are its strengths and weaknesses?
- How does it help save/generate/store or stop wasting energy?
- Who would use their invention?
- How will they approach problems in the future?
- Think of a story involving your invention!

Submitting invention ideas

Creating an invention drawing is great, but it's even better to see it made real!

To be entered in the Little Inventors Pioneers Energy Challenge the invention ideas must be submitted on the pioneers.littleinventors.org website. It only takes a couple of minutes!

Make sure you scan or take a clear unobscured picture of the invention idea so it's not rejected. Alternatively you could ask the young people to upload them, checking first that the quality of the images for a chance to be selected and their ideas made!

Good luck!!!



Good



Not so good!

