

Dogger Bank Teacher Guidance - Year 5

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 in partnership with South Tyneside Council and Dogger Bank Wind Farm are delighted to launch the [Powering the Future: South Tyneside and Beyond!](#) This invention challenge will be delivered to children in Year 4 and Year 5 in South Tyneside, from February 2024.

The *Powering the Future* 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.

Dogger Bank Wind Farm is in process of becoming the world's largest offshore wind farm. It will be capable of powering 6 million British homes. The project will generate a vast source of renewable energy, harnessing the power of wind to provide sustainable energy and reducing the use of fossil fuels.

Year 4 and Year 5 pupils will take on an invention challenge created for their year group, focusing on the role and uses of wind, and the value and forms of renewable energy respectively. The challenges will encourage children to expand their skills in STEM learning and broaden their knowledge of renewable energy and how it can be implemented to bring about positive change for our planet.

As the children get creative and innovate in their ideas, they will learn how their contributions can develop technology and improve the environment in years to come. 4 ideas will be selected from the participating primary schools and will be brought to life by an expert team of makers.

Key Project Dates

Teacher Training Session	18th January
Challenge Launch	1st February
Challenge close	30th April*
Making process for winning ideas	May - June

*** Please note: All invention submissions need to be uploaded prior to 30th April 2024. All details for submissions can be found [here](https://southtyneside.littleinventors.org).**

Familiarise yourself with the resources available before using them. Start by downloading the core challenge resource pack at southtyneside.littleinventors.org:

CORE PACK

‘Powering the Future’ challenge presentation

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

Printed materials

Activity sheet: Let’s move!

Activity sheet: What goes up, must come down!

Activity sheet: Dream green

Activity sheet: My energy day

Challenge Cards: Kinetic

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.

ADDITIONAL MATERIALS FOR FURTHER LEARNING

Inventor's log

There are 3 parts to the Inventor's log:

- **Part 1 - Take your ideas further** - A whole host of extension activities included for students who have really enjoyed the activities and want to take their invention ideas further.
- **Part 2 - Prototyping your ideas** - Step-by-step instructions on how to make propeller powered prototypes with artist Lottie Smith.
- **Part 3 - Curating your exhibition** - Activities around designing your own exhibition, including an exhibition layout, labels, poster and invites.

Classroom Exhibition Pack - This downloadable pack includes a printable poster, banner, exhibition invites and certificates to put on your very own classroom exhibition. It can be used in conjunction with the Inventors Log Part 3 - Curating your exhibition.

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 kinetic energy - the more young people know about the topic before they do their invention, the better!

Get started!: Powering the Future: South Tyneside and Beyond!

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.

Dogger Bank Wind Farm is a beacon of renewable energy. This type of energy helps address the issue of climate change. Climate change impacts all living things on the planet; humans, animals, and plants. Small actions like switching up things in our daily routine can make a difference and are necessary in improving the health of our world.

The Year 5 challenge is to invent something that creates renewable energy by harnessing power from movement. This will help us reduce the use of fossil fuels and prevent climate change!

The energy of motion is called kinetic energy. This movement could be dancing, running, shivering, swaying, and so much more!

How about a battery that is powered from the movement of a dance-off? A pair of shoes that you walk in for a bit to generate energy, then they turn into mini hoverboards? How about harnessing the energy from a live orchestra or from bouncing on a pogo stick!

Time to get moving and shaking, thinking and making!

Open the Powering the future presentation and go through the slides with your class:

- For additional support and guidance please refer to the slide notes where tips for delivery have been provided.
- The presentation can be delivered over a number of lessons.

Slide 1	Welcome your class to the new 'Powering the future' challenge!
Slide 2	Who are Little Inventors
Slide 3	Mission: Little Inventors
Slide 4	What is an invention?
Slide 5	Who needs inventions?
Slide 6	Where can inventing take you?
Slide 7	Bonkers is brilliant!
Slide 8	Watch this!
Slide 9	What's Dogger Bank
Slide 10	We're challenging you!
Slide 11	The North - A Powerhouse of invention
Slide 12	What is climate change?

Slide 13	What is the impact of climate change?
Slide 14	Climate and energy
Slide 15	Energy makes the world go round
Slide 16	Way back when
Slide 17	Energy in the digital age
Slide 18	Look to the future
Slide 19	Feel the power
Slide 20	A force for good
Slide 21	How can nature inspire invention?
Slide 22	Power up: Year 5 challenge
Slide 23	Coming up with ideas
Slide 24	Invention Drawing Sheet
Slide 25	Submit your ideas

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?

Activities

Activity Sheet: Let's move!

- Hand out the Let's move! Activity sheet.
- Explain to the students that they are going to explore movement and think about their everyday movement behaviours.
- Encourage students to rethink the way we move and behave and make it much more fun!
- Begin with the simple mapping exercise which will get the class thinking about the different ways they move their bodies each day or each week. Explain that they can include sporting activities and games, but the activity sheet is about movement and actions within school and indoors. Give the students prompts to get them thinking differently:
Their daily routines - getting up, getting dressed, having breakfast and cleaning their teeth.
Cooking or making food.
Tidying up, hoovering
Moving around the school - walking up and down the stairs, moving from room to room.
- Students then examine their ideas and think about how they can make them more fun! If students need encouragement to think differently about movement, provide some prompts:
Could they add anything to the movement or action - moving from room to room swinging on ropes, getting down stairs by slide, going upstairs on a treadmill.
Could they make their breakfast on a bike?
Could they get dressed using a clothes decision making machine?
- Ask students how they can make these ideas environmentally friendly. Explain this could be through materials, power, multiple use, or whether their idea could harness energy.



Differentiation

The mind mapping exercise can be done in pairs, groups or as a whole class activity. Students can stand and move around the room, exploring different movements of the body. In groups, or as class, play a game of movement charades!

Extension

Design a poster or act out an advert for their new idea.

Follow up

Encourage students to use their inventor's logs to record ideas, thoughts and sketches

they have made so far.

Activity Sheet: What goes up, must come down!

- Hand out the activity sheet.
- Discuss the classifications of energy, specifically kinetic and potential.
- On the activity sheet there are examples of kinetic energy. Have a discussion within the class about different examples of kinetic energy.
- Ask students to come up with 3 separate examples of their own on the sheet.
- Discuss how a roller coaster ride uses the transfer of potential to kinetic energy to move along the track.
- In the box the students can design their own roller coasters! Ask them to label where the kinetic energy is generated.

Differentiation: Some students may prefer to create a roller coaster using paper. You would need a few sheets of paper, some scissors and some glue. Students can use different folding and circling techniques to create their roller coaster.

Extension activity: Students can design a whole funfair! Drawing out different types of rides and investigating different types of forces at play on their rides.

Additional whole class extension activity: Design a roller coaster in the classroom using chairs, tables, boxes and any other materials! A ball could be used to test out different sections of the track.

Activity sheet: Dream green

- Distribute the dream green worksheet.
- Ask students to choose a room in their school or a space they know well.
- On the worksheet, list all the things which use energy within the space - TV, console, heating, lighting, water.
- The worksheet focuses on problem solving. Encourage students to think about what problem they can solve within their chosen room. This could be water wastage, lots of appliances using a lot of energy, an alternative heating system. Ask students to think about interesting ways they could use the walls, ceilings, floor and windows.
- Encourage students to think about how nature could provide inspiration and solve problems. Students could explore bringing the outside inside, or think about how nature can help reduce energy consumption.

- Students draw and label their room. The labels indicate what has been added, removed or modified. Give students the freedom to change some infrastructure such as ceilings, walls, floors and windows.

Differentiation

Students may benefit from working in groups and choosing a room they all know from within the school. In groups they can visit the room and find all the things which use energy within the space. They could draw a diagram of the room and mark where everything is. This can then be shared with the class.

Extension

Students can create a diorama of the newly modified space using recycled materials.

Follow up

Students can share their modifications with the class, leading to a whole class discussion. Students can look at how they can change things within the school to reduce energy consumption.

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), recording ideas in their inventor's log. They could research the information for more accurate results.

Challenge Cards - Kinetic

- The challenge cards are designed as quick fire creative catalysts to help students start inventing quickly.
- Students can work independently or in small groups on this activity.
- Hand out the challenge cards, there are a number of challenges in each pack, you may decide to only use two sets of cards in your class. They will need to be cut up and then distributed amongst the students.
- Students can decide how they wish to use the cards, they can share verbal ideas and then develop the ideas further as a group or they may wish to start sketching or prototyping using scrap materials straight away.

Differentiation

Some students may prefer to work with their hands straight away and sketch or make models of some of the things they think you may need in space. Some students may benefit from having one area of the activity to focus on e.g. Create a new way of getting down the stairs

Extension

Is there an element of this activity that the students would like to develop further? Students that finish the activity quickly can review each other's ideas.

Follow up

Encourage students to make notes, record their ideas in their inventor's log and explore ideas through drawings.

Drawing sheet: My invention!

Challenge: Invent something that creates renewable energy by harnessing power from movement. This will help us reduce the use of fossil fuels and prevent climate change!

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?

- How does it work?
- What is it made of?
- What made them think of it/ what was their inspiration?

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.

Encourage the class to use their inventor's log to sketch ideas or create a mind map.

Round-up: (5–15 mins)

Ask young people to reflect on their inventions and discuss them with a partner. 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!

Please submit the 5 best ideas from your class of your choosing.

We know it can be tricky to choose as there will be so many fantastic ideas so here's our criteria recommendations for being chosen (but feel free to create your own criteria!):

- Most fun
- Most detailed
- Most innovative
- Most likely to succeed within the chosen environment
- Wild card - this could be an invention from a student that rarely gets picked in school or a student that is a little shy/needs a little confidence boost!

To be entered in the Powering the Future Challenge the invention ideas must be submitted on the southtyneside.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!

All invention submissions need to be uploaded prior to 30th April.

To celebrate all of the children in your class and their wonderful ideas we have included certificates in the Classroom Exhibition Pack which can be downloaded from southtyneside.littleinventors.org.

Inventor's log

The Inventor's log allows students to take their ideas further, experiment, sketch and explore. There's space within the logs for students to investigate new ideas, carry out additional activities and work in 3D. After all the hard work, why not show off the incredible inventions through curating your own class exhibition?

The Inventor's log is split into three parts:



- Part 1 - Take your ideas further
- Part 2 - Prototyping your ideas
- Part 3 - Curating your exhibition

Part 1 - Take your ideas further

There is a whole host of extension activities included for students who have really enjoyed the activities and want to take their invention ideas further. These activities can take between 10 mins - 2 hours depending on how many of the activities they engage with. You can do these extra activities in class time or give to your students to complete at home.

Top Tip: Give students extra invention sheets to come up with more invention ideas at home.

Part 2 - Prototyping your ideas

As well as the group prototyping activity explained towards the end of this guide, if the students have more time and want to take their ideas to the next level they can bring their inventions to life in 3D.

This group of activities includes top tips for how to start thinking in 3D, how to draw up side views, plan and birds eye views of their invention and different techniques to bring their own idea to life.

For more tips and tricks on prototyping you can take a look at our [Get Making Pack](#) online or visit our [YouTube channel](#) where you can find lots of videos on cardboard prototyping skills.

Part 3 - Curating your exhibition

Within the Inventor's Log Part 3 pdf you will find lots of activities based around curating your very own exhibition, such as planning and drawing your exhibition, space to design a welcome board, labels and invites to the exhibition!

At southtyneside.littleinventors.org you will also find the Classroom Exhibition Pack which includes pre-designed posters, banners, certificates and invites for your very own Powering The Future Exhibition. So you can use these if your class has run out of time to design their own posters and more, or a combination of the two!

Top Tip: Invite the wider school community to visit the exhibition where the children are the exhibition guides.

Prototyping - Propeller Power

There are step-by-step instructions included on how to make propeller powered prototypes with artist Lottie Smith. There are two parts to the prototyping section:

- Propeller Power: Lift
- Propeller Power: Forward Motion

Watch the Propeller Power tutorials via the Little Inventors YouTube channel or find them in the resource list at <https://southtyneside.littleinventors.org> to learn how:

- [Propeller Power: Lift](#)
The tutorial is split into sections, you will be able to see the names and timings in the description text.
- [Propeller Power: Forward Motion](#)
The tutorial is split into sections, you will be able to see the names and timings in the description text.

There are also written and illustrated instructions included in the resource pack.

For any further help with the challenge please don't hesitate to contact hello@littleinventors.org