



# WE'VE GOT THE POWER!

## QUICK ACTIVITY

**KS3**

SAVE INK - don't print this first page!

## Lesson overview

This activity reinforces students' knowledge about the energy mix; how we generate electricity using renewable (wind, solar) and non-renewable (gas, nuclear) energy resources; and the impact of different energy resources on the environment.

## Learning objectives

- ▶ Explain the pros and cons of different energy resources
- ▶ Understand the impact our choice of energy resources has on the environment and climate change
- ▶ Learn about the processes for generating electricity from different energy resources
- ▶ Consider the factors that influence a country's energy mix
- ▶ Identify different jobs in the low-carbon energy sector

## Subjects

Science, Geography

## Gatsby Benchmarks

### 2: Learning from career and labour market information:

Find out about jobs in the low-carbon energy industry – and the routes available into them.

## Timings

- ▶ Main activity: 40 mins
- ▶ Careers in energy: 20 mins

## Materials and set-up

This **Activity Pack** contains the following materials:

- ▶ Teacher notes
- ▶ Student worksheet

This activity can be used in the classroom, led by a teacher. Or share the Teacher notes and Student worksheet with families who are home schooling.

This quick activity is a good follow-up to **The Energy Pick n Mix activity**

# THE MAIN ACTIVITY

(40 mins)

## Part 1: Renewable or non-renewable?

Energy resources are either renewable or non-renewable. But do you know what the difference is?

**Complete the two sentences in your Worksheet:**

**Renewable energy resources** will never run out. They can be replaced and are a natural source of energy.

**Non-renewable energy resources** won't last forever, as they're based on materials we get from the Earth. So they will run out at some point and cannot be replaced when they're all used up.

Students don't need to write down the same definitions as here, but check they've understood the main differences correctly.

Now let's see if you can give any examples of each type!

*In one minute, fill in the table in your Worksheet with as many renewable / non-renewable energy resources as you can think of.*

RENEWABLE ENERGY RESOURCE	NON-RENEWABLE ENERGY RESOURCE
Solar	Coal
Wind	Oil
Wave	Gas
Hydro	Nuclear
Biofuel	
Geothermal	
Tidal	

## HPC Inspire

We're Hinkley Point C's Education Programme in Somerset and the wider South West region. And we're here to help young people take advantage of the huge opportunities that the construction and

operation of HPC has to offer. We do this through a range of fun and innovative activities: including hands-on STEM workshops, careers assemblies and online learning resources.

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**Part 2: Spot the difference**

The energy mix is the name given to the combination of different energy resources used to generate electricity – and it's changed dramatically over the years.

**Answer the two questions in your Worksheet.**

**1. Q. Why do we have an energy mix instead of relying on one single energy source?**

**A.** All energy resources have strengths and weaknesses. By having a diverse energy mix, we can make our electricity system more resilient.

**2. Q. What factors influence a country's energy mix?**

**A.** There are several, including:

**Government rules:** In recent years, the Government has said it wants to use more renewable energy resources to meet its climate change targets. There has also been public pressure for the Government to tackle climate change.

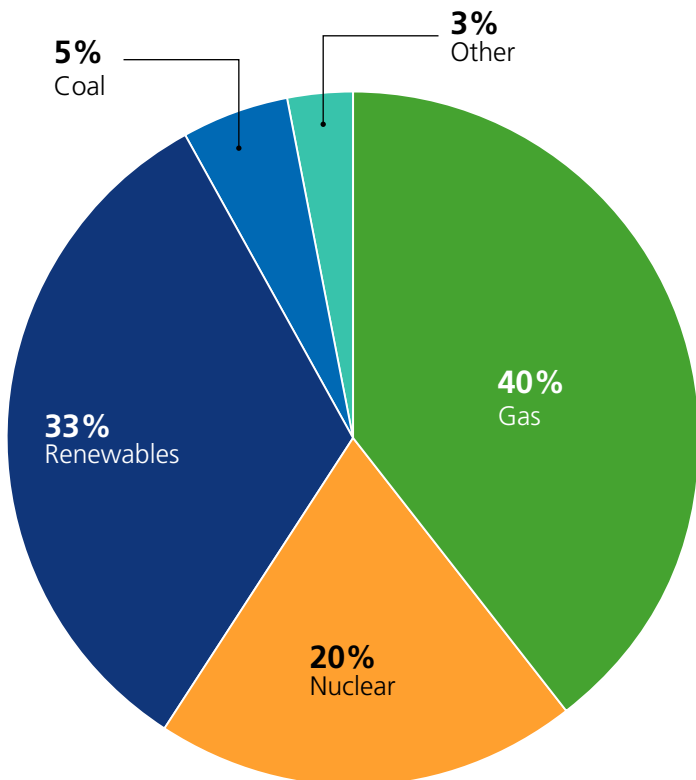
**Price:** The price of fossil fuels has gone up and down over time. For example, in the early 1970s, oil became really cheap so the UK switched to using more oil at the start of that decade.

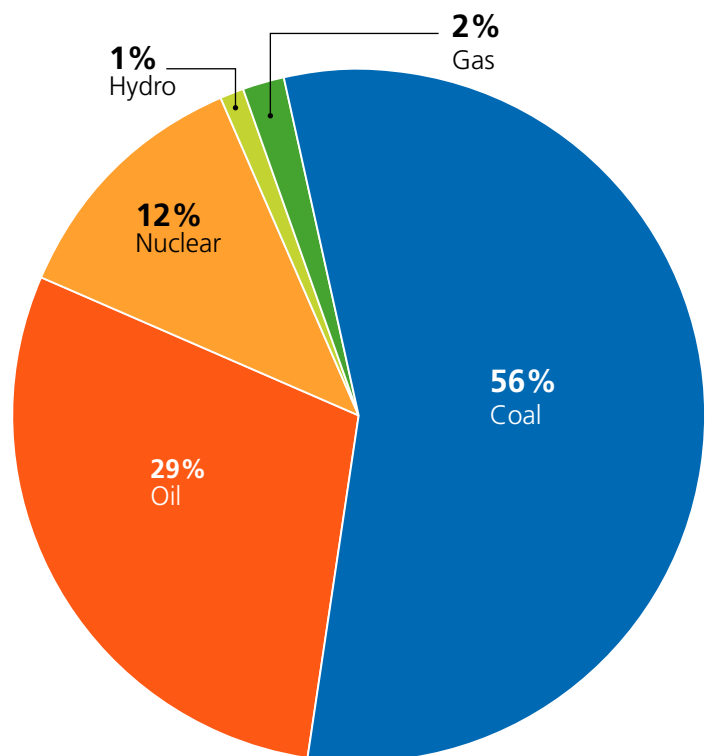
**New technologies:** The UK started to use more nuclear from the 1960s onwards; while in the 1990s, gas became a significant source as the first gas-fired generation plant was built at the start of the decade.

**Geography and climate:** You need hills and windy areas for wind power, for instance. And sunny weather for solar power to work!

As before, students don't need to give the exact same definitions as here, but check they've understood the main differences correctly.

Now, take a look at the two pie charts in your Worksheet. **Put a tick in the box next to the one that you think represents the UK's energy mix in 2018. Then, below the pie chart, write a sentence explaining the reasons behind your choice.**





### Part 3: Jump to it!

Jump up and down on the spot for **ONE minute** and give **ONE pro** and **ONE con** for each of the following energy resources: nuclear, gas, wind and solar.

Check students' answers against the table below.

ENERGY RESOURCE	PROS	CONS
<b>Nuclear</b>	<ul style="list-style-type: none"> <li>▶ Low carbon</li> <li>▶ Not likely to run out any time soon</li> <li>▶ Reliable: provides baseload electricity</li> <li>▶ Higher output and less land space required than for renewables</li> </ul>	<ul style="list-style-type: none"> <li>▶ Uses a non-renewable fuel (uranium)</li> <li>▶ Building a nuclear power station is a big investment project, involving government and other organisations</li> <li>▶ Nuclear waste remains radioactive, so the waste products require long-term management in special facilities</li> </ul>
<b>Gas</b>	<ul style="list-style-type: none"> <li>▶ Reliable</li> <li>▶ Flexible</li> <li>▶ Fairly low-cost way to generate power</li> </ul>	<ul style="list-style-type: none"> <li>▶ Gas is a non-renewable resource, so it will run out</li> <li>▶ Not low carbon</li> <li>▶ It produces pollution and contributes to climate change</li> </ul>
<b>Wind</b>	<ul style="list-style-type: none"> <li>▶ Low carbon; no pollution. The UK is also the windiest country in Europe</li> <li>▶ Offshore wind turbines can generate more electricity than onshore wind</li> <li>▶ Relatively low cost to run and no fuel costs</li> </ul>	<ul style="list-style-type: none"> <li>▶ Variable power source (no wind = no electricity)</li> <li>▶ Limited development onshore due to available land space</li> <li>▶ Offshore wind farms are trickier and more expensive to build</li> </ul>
<b>Solar</b>	<ul style="list-style-type: none"> <li>▶ Low carbon; no pollution</li> <li>▶ We get enough sunlight in the UK to make it a viable energy source</li> <li>▶ No fuel costs</li> </ul>	<ul style="list-style-type: none"> <li>▶ Variable (it doesn't work well in cloud or at all at night)</li> <li>▶ Restricted by the amount of land space required</li> <li>▶ Solar power can't be stored very easily or cheaply over a long period</li> </ul>

### Part 4: True or false?

Read the statements in your Worksheet and answer true / false for each question.

**1. Q. We can get energy from the sun 24 hours a day.**

**A.** False – you can only capture solar power when the sun is shining, so it doesn't work at night time.

**2. Q. Gas is a renewable energy resource.**

**A.** False – It's a fossil fuel and will run out eventually.

**3. Q. Wind power doesn't produce any pollution.**

**A.** True – this renewable energy resource doesn't emit any carbon emissions.

**4. Q. Nuclear power contributes to climate change.**

**A.** False –the nuclear generation process doesn't generate any carbon emissions.

**5. Q. Generating electricity from gas produces carbon dioxide emissions.**

**A.** True – gas is a fossil fuel and burning fossil fuels generates carbon dioxide emissions. This is contributing to climate change.

**6. Q. Offshore wind turbines generate more electricity than onshore wind turbines.**

**A.** True – offshore turbines are usually much larger, so they can generate more electricity.

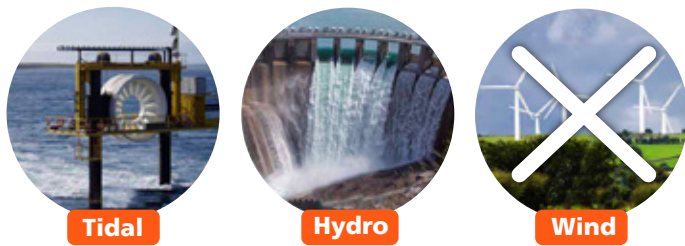
**Part 5: Odd one out**

*Put a cross through the odd one out for each question in your Worksheet.*

**1.** Which one of these energy resources doesn't contribute to climate change?



**2.** Which one of these energy resources doesn't use water as the fuel source for generating electricity?



**3.** Which one of these energy resources is a fossil fuel?



**4.** Which one of these energy resources don't we use in the UK?



**5.** Which one of these energy resources was the biggest contributor to our energy mix in 2018?



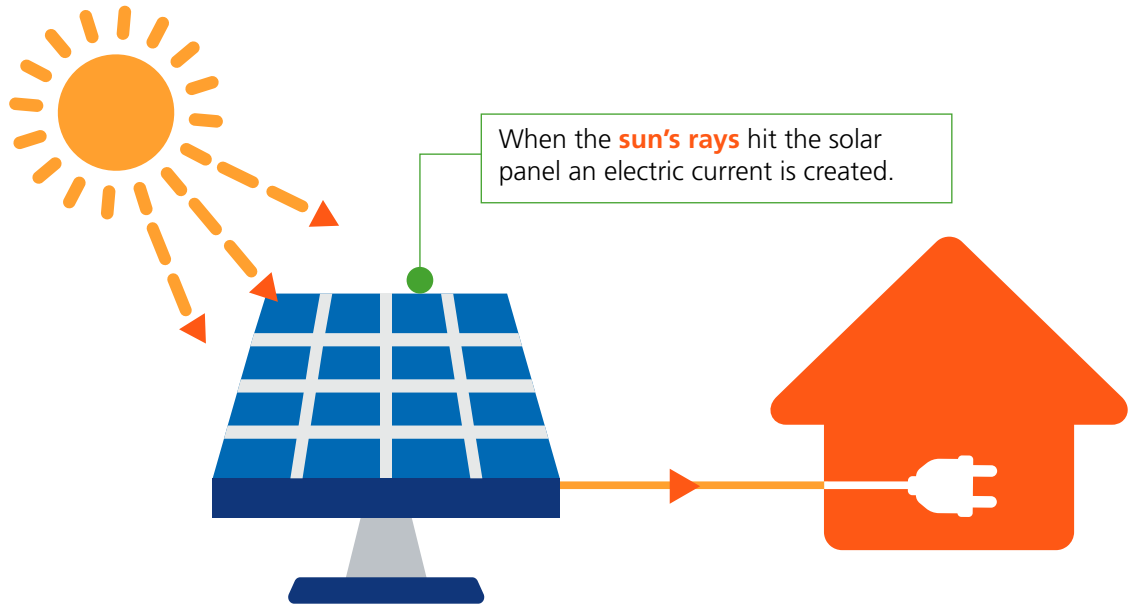
**6.** Which one of these energy resources is unlikely to feature in the UK's 2050 energy mix?



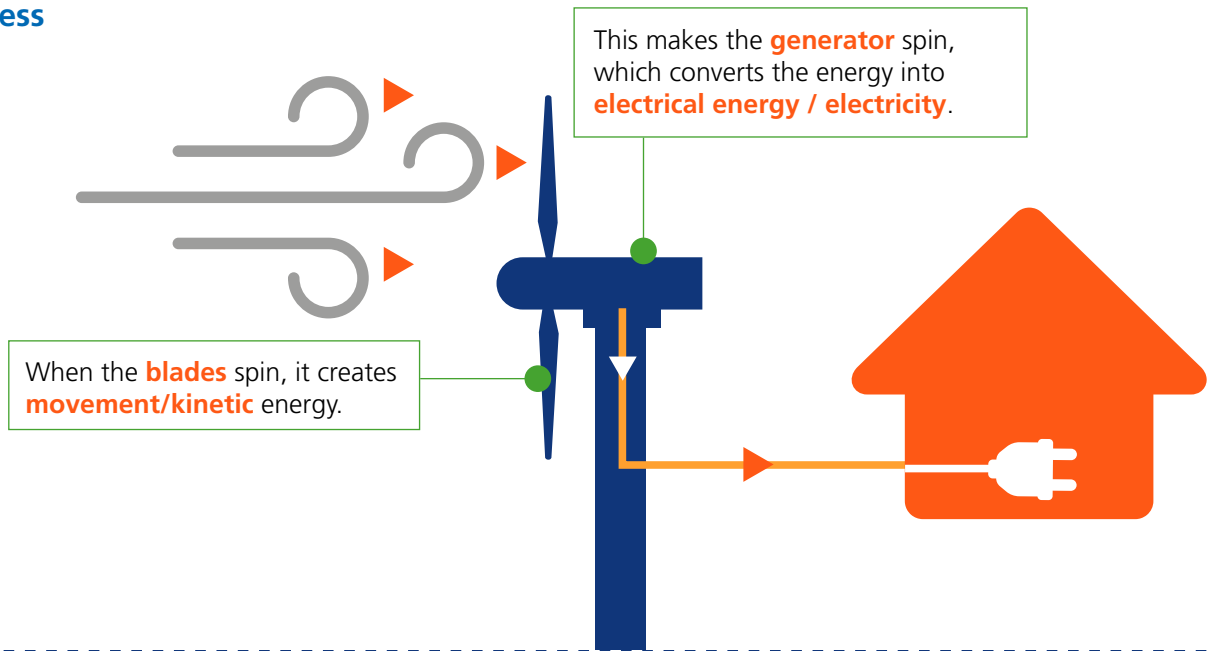
### Part 6: The generation name game

Can you correctly label the diagrams in your Worksheet that show different ways of generating electricity?

This diagram shows the process for generating **solar power**.

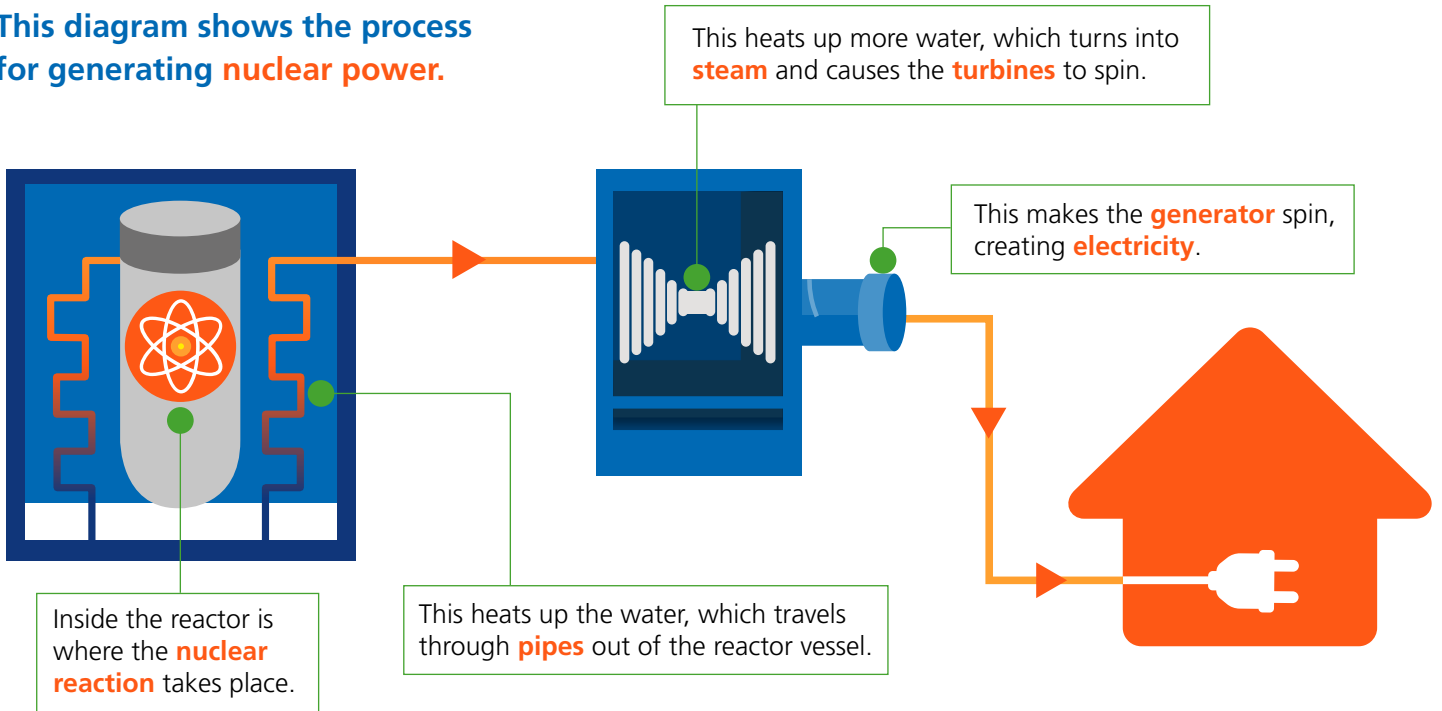


This diagram shows the process for generating **wind power**.

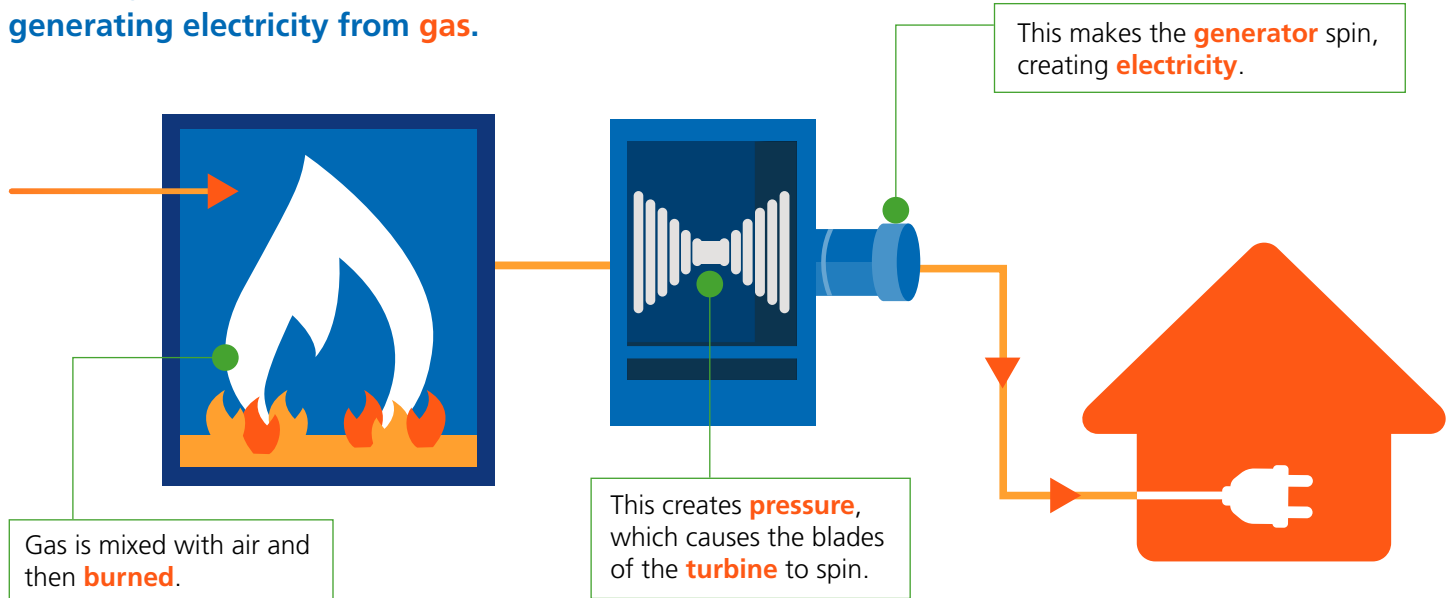


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This diagram shows the process for generating **nuclear power**.



This diagram shows the process for generating electricity from **gas**.



**Did you know...** Electricity is generated from the leftover hot exhaust gases too? Before they disappear up the chimney, they pass through pipes and heat up the water around them. This turns into steam and passes through another set of turbines. And, as before, this makes the generator spin, creating electricity.

## CAREERS IN ENERGY

20 mins

### Job matchmakers

There are all sorts of jobs in the energy industry, particularly in the low-carbon sector producing renewable and nuclear power. Generating all our electricity from low-carbon sources will help the UK achieve its goal of net-zero carbon emissions by 2050.

**Can you match up these job descriptions with the right person? Draw a line to connect them.**



Repair and maintain equipment in a nuclear power station



Fit and repair solar panels



Provide technical advice and support on a construction site



Repair and maintain wind turbines

#### Wind turbine technician

Wind turbine technicians work on wind farms. They maintain and repair the equipment, so the turbines continue to work properly. It's a varied and manual job that involves problem solving (working out why something's not functioning) and being able to follow safety guidelines. You could be dealing with very large machinery. Working 80m off the ground. Or out at sea on an offshore wind turbine.

[Find out more on the National Careers Service.](#)

#### Site engineer

As a site engineer on a construction site like Hinkley Point C, you could be involved in anything from checking the layout and technical design of the new power station; to checking that health and safety guidelines are being followed; and organising the materials and people on site.

[Read more on this website.](#)

#### Nuclear technician

Nuclear technicians carry out an important role in maintaining the equipment in a nuclear power station. It involves hands-on work repairing and maintaining machines and tools. So you'll need to be able to work methodically and pay attention to details. As you'll be working in a nuclear power station, you'll need to follow strict safety and security rules.

[Find out more on the National Careers Service.](#)

#### Solar panel technician/installer

Solar power technicians fit and maintain solar panels on homes or large solar farms. You will need to work methodically, problem solve and know how to work with electricity safely. The job involves working outside – although there could be some work in a lab, depending on the role – and will involve travelling to different sites.



We've Got the Power! quick activity **KS3**

**Could your future career be at HPC?**

Hinkley Point C is the new power station we're building in Somerset. It'll generate 7% of the UK's electricity – that's enough to power six million homes! And it'll be low-carbon electricity, as generating electricity from nuclear power doesn't produce any carbon emissions. So it'll help the UK Government achieve its target of net-zero carbon emissions by 2050 too.

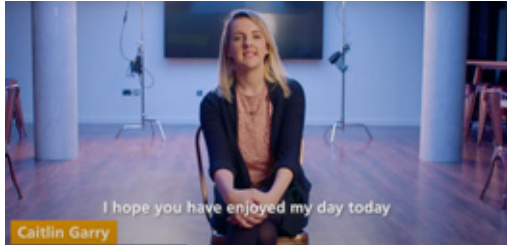
**At Hinkley Point C, we'll be training 1,000 apprenticeships during the build and operation of the new power station. Here are some of the job roles that will be available:**

**During the build:**

- Project Planner
- Electrical Technician
- Project Manager
- Steel Fixer
- Drivers
- Control room operator
- Site Engineer
- Painter
- Engineers
- Demolition Operative
- Security Staff
- Pipe Fitter
- Managers
- General Construction
- Cleaners
- Finance
- Large Plant Operator
- Ground Worker
- Chemists
- Operative
- Small Plant Operator
- Energy Analyst
- Scaffolder
- Physicists
- Catering Staff
- Estimator
- Joiner
- Welder
- Concrete Operative
- Industrial Safety
- Soil Contamination
- Clerical Worker
- Maintenance technician
- Plant operator
- Carpenter
- Plant Manger
- Architect
- Heating and Ventilation Engineer
- Quantity Surveyor
- Engineering Operative
- Logistics support

**Once the power station is operational:**

- Document technician
- Communications
- Procurement & Supply Chain
- Training
- Apprentice
- Graduates
- Fuel Management
- Radiation Protection Technicians
- Nuclear Safety Engineers
- Operational Crafts
- Org Learning
- Security
- Finance
- Quality Assurance
- Junior Chemistry Engineer
- Operational Engineers
- HR
- Engineering/Technical Roles
- Information Management (including Com's & IT)
- Project Management
- Radiation Protection Engineers
- Nuclear Safety



**Meet Caitlin...**

To find out what it's like to work at HPC, watch this **day in the life film** of Caitlin, a quantity surveyor apprentice on the project. Then answer this question:

- Q. Give three benefits of being an apprentice at EDF Energy**
- A.** Students could have given their answers from the following: working on one of the biggest construction projects in Europe; getting hands-on experience; working on-site and in the office; receiving a great salary and benefits package; furthering their education with a recognised qualification.



**Meet Sam...**

Watch **this film** with Sam, an apprentice at Dungeness power station and then answer the following questions:

- Q. Why didn't Sam want to go to university?**
- A.** He felt he ought to go, but it didn't feel right.
- Q. What would Sam say to anyone considering an apprenticeship?**
- A.** Go for it – there's nothing else quite like it that offers the same level of education and comradeship.
- Q. What are some of the extra-curricular activities Sam's taken part in during his apprenticeship training?**
- A.** Skydiving and snowboarding.

**Did you know...** With an apprenticeship, you get paid to learn on the job *and* achieve a qualification? **Find out more at** <https://careers.edfenergy.com/content/Apprenticeships-and-Degree-Apprenticeships/>

## Useful links

**BBC Bitesize for Geography – Energy and resources:** <https://www.bbc.co.uk/bitesize/topics/zjsc87h>

**BBC Bitesize for Physics – Fuels and energy resources:**  
<https://www.bbc.co.uk/bitesize/guides/zggk87h/revision/1>

**Hinkley Point C:** <https://www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c>

**Starting your career in nuclear power:** [https://careers.edfenergy.com/content/Early-Careers-at-EDF-Energy/?locale=en\\_GB](https://careers.edfenergy.com/content/Early-Careers-at-EDF-Energy/?locale=en_GB)

**Different roles in wind energy:** <https://www.facesofwindenergy.com>

**Discover what happens inside a nuclear reaction in this film:** [https://www.youtube.com/watch?v=3iQBMyGmg-8&list=PLXelrBe86r\\_K1Czba0ZOnMbkGChwu7pYb&index=7&t=0s](https://www.youtube.com/watch?v=3iQBMyGmg-8&list=PLXelrBe86r_K1Czba0ZOnMbkGChwu7pYb&index=7&t=0s)

**Find out about early careers at EDF:** [https://careers.edfenergy.com/content/Early-Careers-at-EDF-Energy/?locale=en\\_GB](https://careers.edfenergy.com/content/Early-Careers-at-EDF-Energy/?locale=en_GB)

**Learn more about HPC with these activities:** <https://guest.startprofile.com/employer/19335/activities>

**Find out about some of the upcoming job roles at HPC:** <https://guest.startprofile.com/employer/19335/job-roles>

## Curriculum links

**Science:** Physics – Energy;

**Geography:** Human and physical geography – human geography relating to: the use of natural resources

Find out more about **Hinkley Point C** and **careers in the nuclear industry**

## THE MAIN ACTIVITY

### Part 1: Renewable or non-renewable?

Energy resources are either renewable or non-renewable. But do you know what the difference is?

Define the following two terms:

**Renewable energy resources:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Non-renewable energy resources:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

In one minute, fill in the table below with as many renewable / non-renewable energy resources as you can think of.

<b>RENEWABLE ENERGY RESOURCE:</b>	<b>NON-RENEWABLE ENERGY RESOURCE:</b>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

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quick activity **KS3**

**Part 2: Spot the difference**

The energy mix is the name given to the combination of different energy resources used to generate electricity – and it's changed dramatically over the years.

Answer the two questions below.

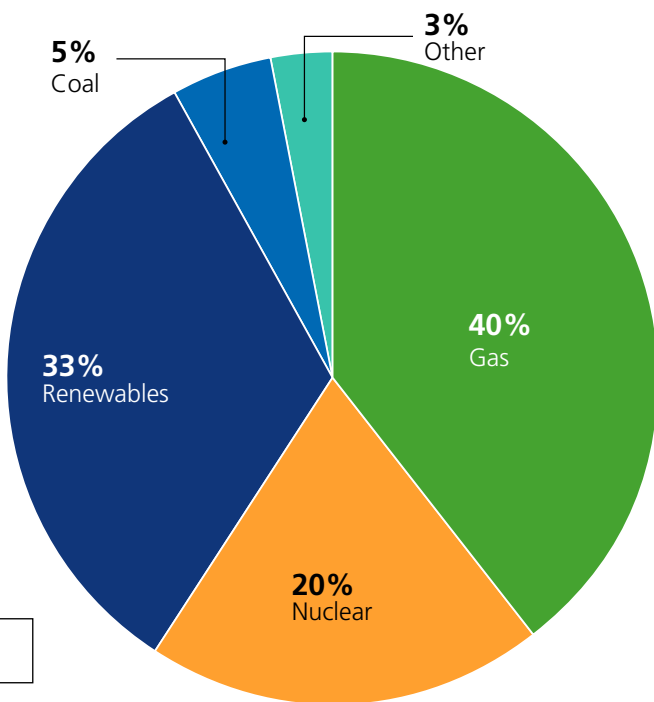
**1. Q. Why do we have an energy mix instead of relying on one single energy source?**

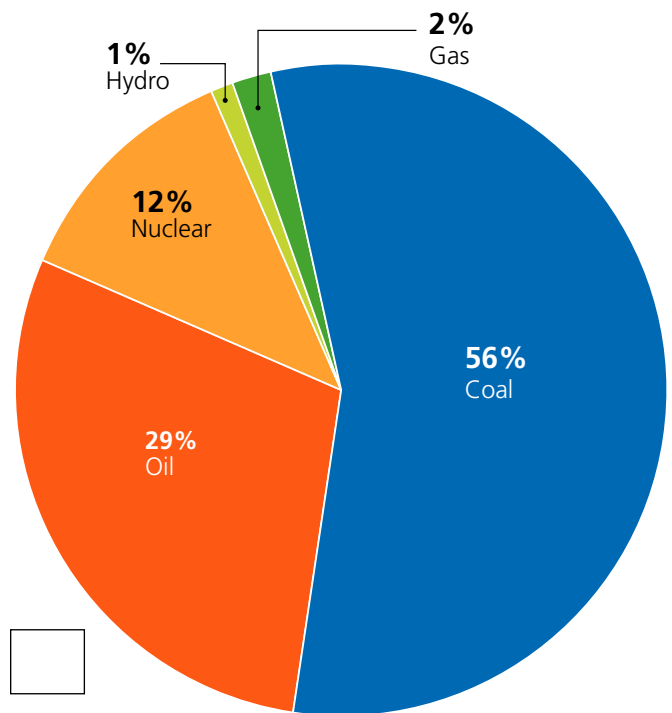
**A.** \_\_\_\_\_  
\_\_\_\_\_

**2. Q. What factors influence a country's energy mix?**

**A** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Now, take a look at the two pie charts below. Put a tick in the box next to the one that you think represents the UK's energy mix in 2018. Then, below the pie chart, write a sentence explaining the reasons behind your choice.






\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Part 3: Jump to it!

Jump up and down on the spot for ONE minute and give ONE pro and ONE con for each of the following energy resources: nuclear, gas, wind and solar.

### Part 4: True or false?

Read the statements below and answer true / false for each question. There's extra space in case you want to give a reason for your answer.

**1. Q. We can get energy from the sun 24 hours a day.**

A. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**4. Q. Nuclear power contributes to climate change.**

A. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**2. Q. Gas is a renewable energy resource.**

A. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**5. Q. Generating electricity from gas produces carbon dioxide emissions.**

A. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**3. Q. Wind power doesn't produce any pollution.**

A. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**6. Q. Offshore wind turbines generate more electricity than onshore wind turbines.**

A. \_\_\_\_\_  
\_\_\_\_\_  
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We've Got the Power!  
quick activity **KS3**

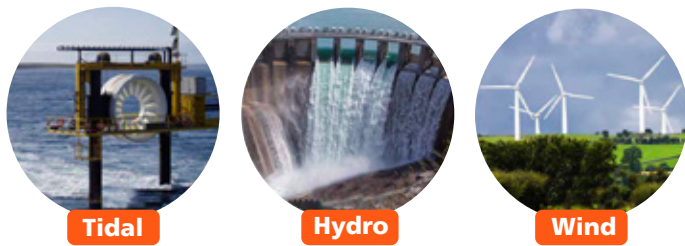
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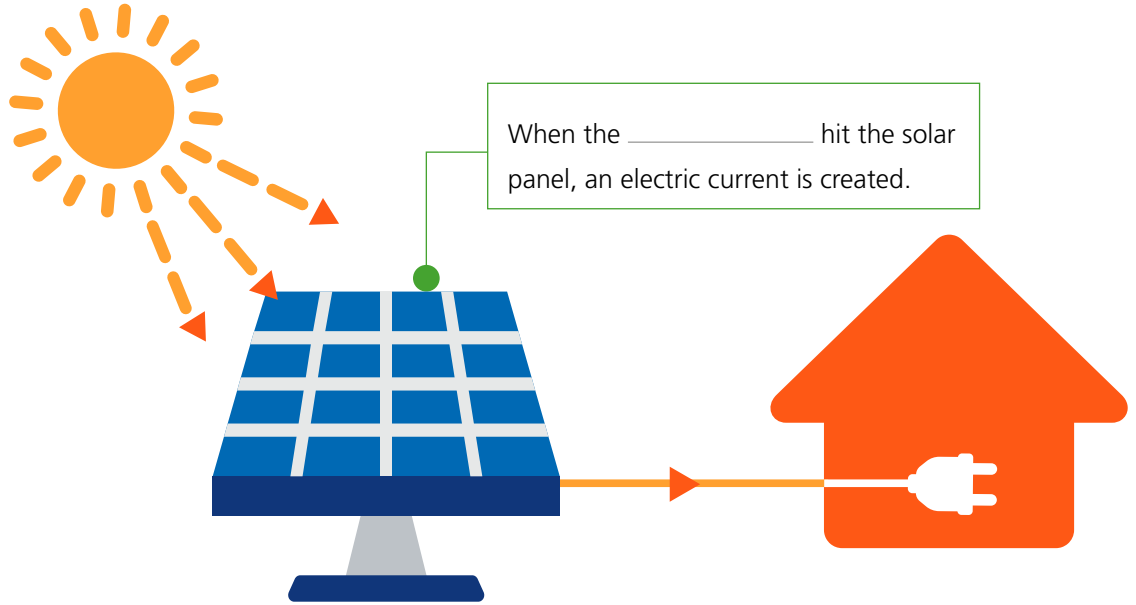


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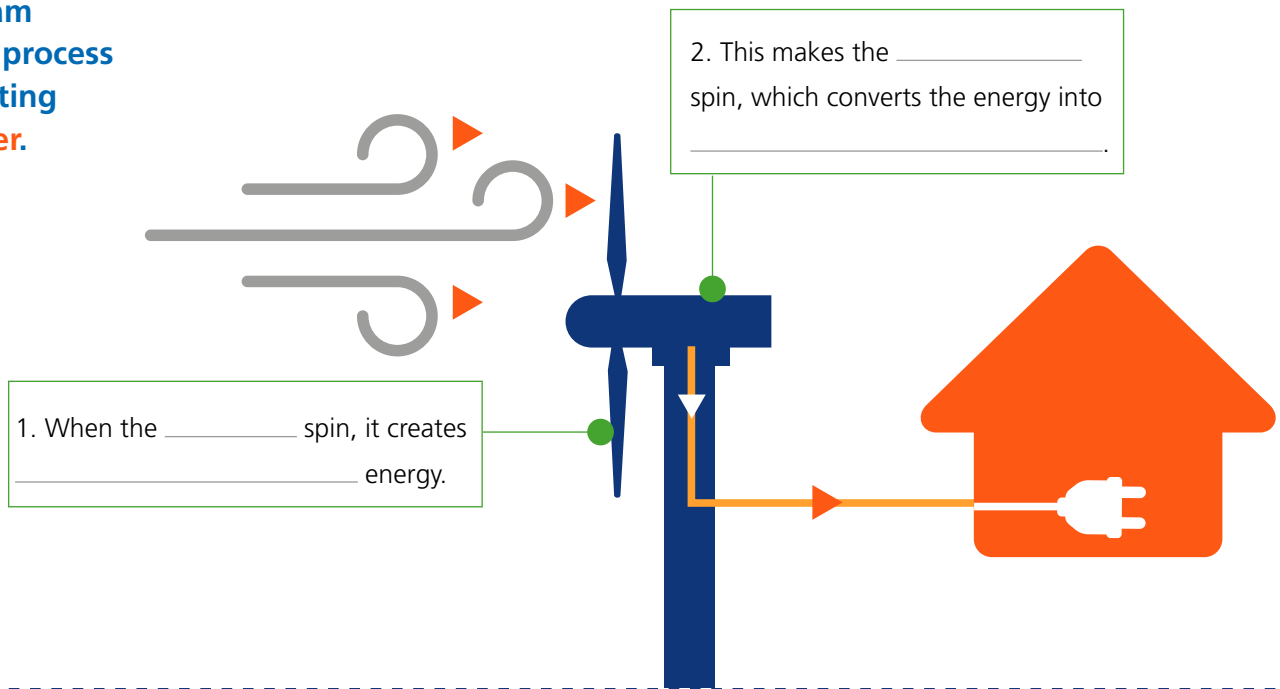
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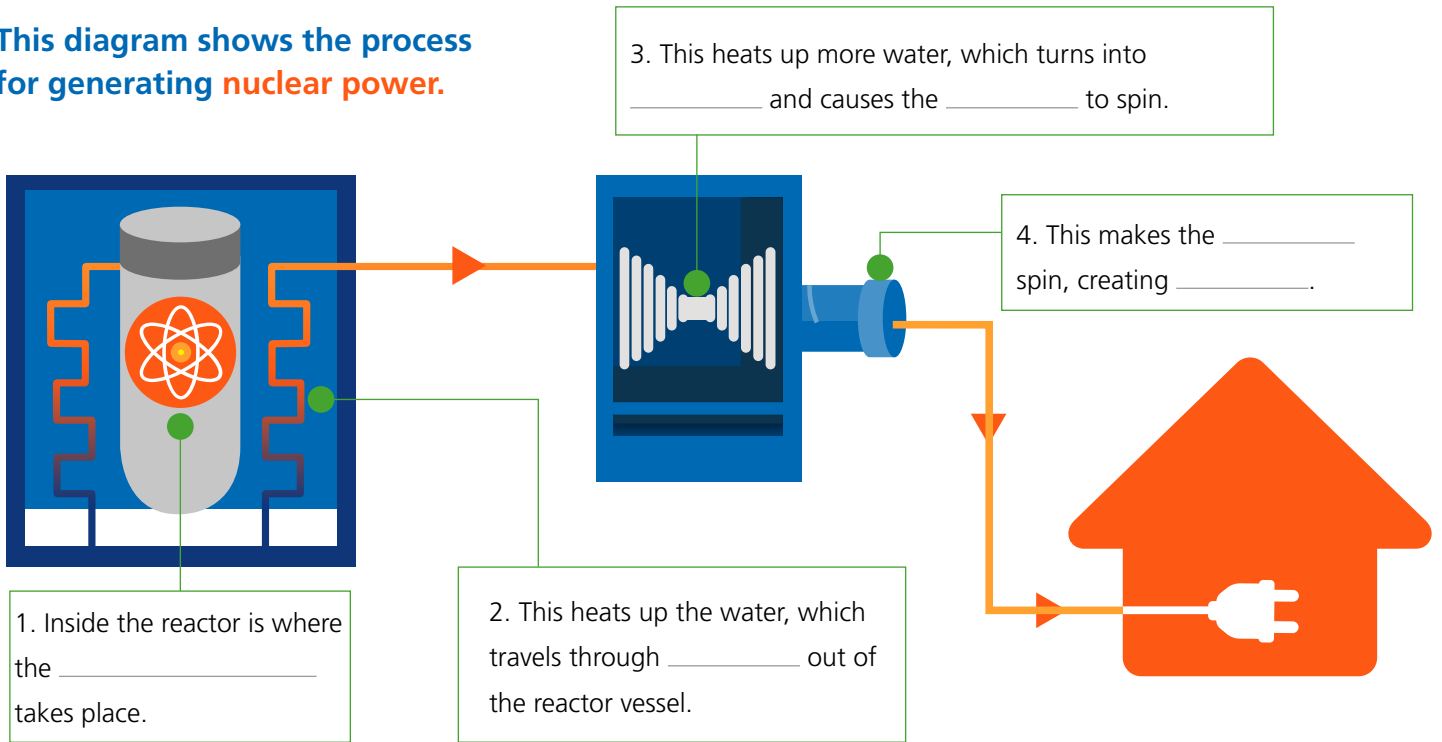


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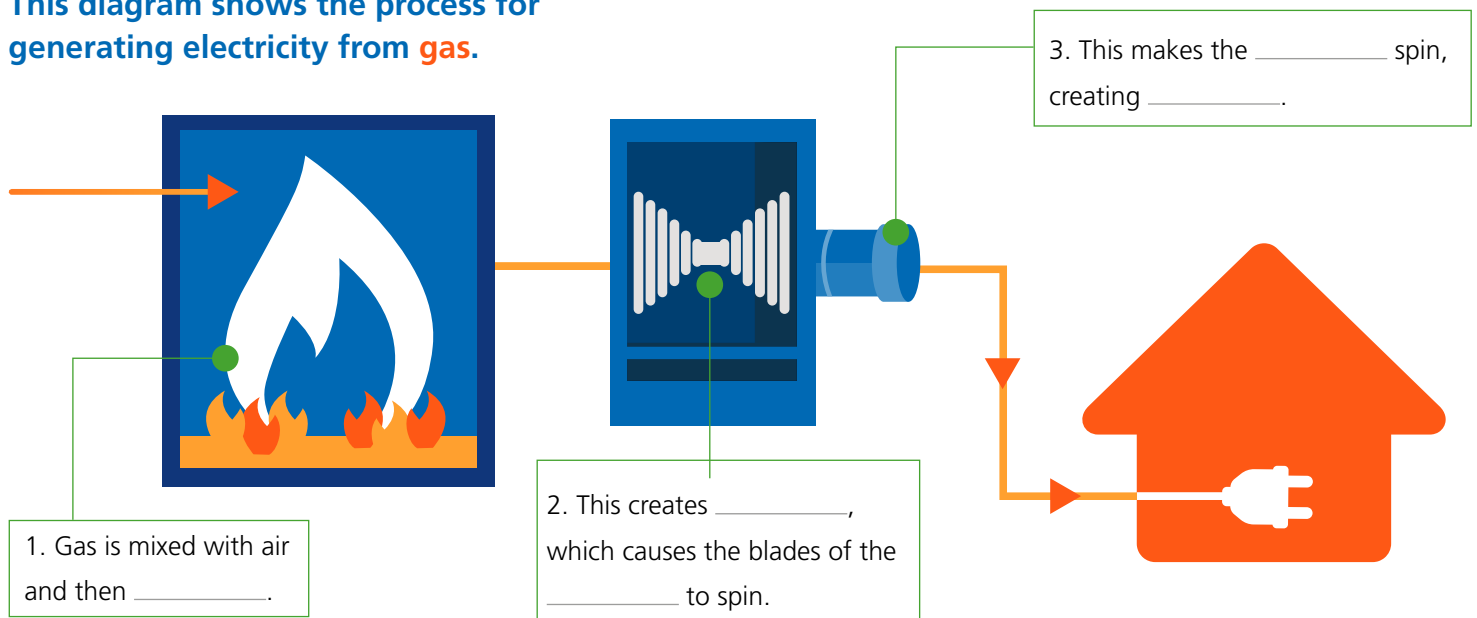


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## CAREERS IN ENERGY

### Job matchmakers

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**Can you match up these job descriptions with the right person? Draw a line to connect them.**



**Repair and maintain equipment in a nuclear power station**

**Fit and repair solar panels**




**Provide technical advice and support on a construction site**

**Repair and maintain wind turbines**



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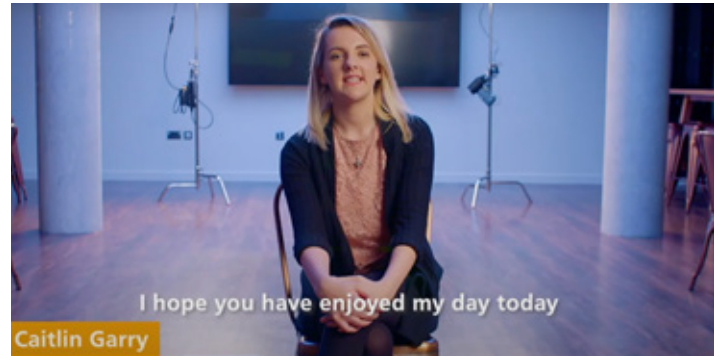
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Project Planner  
 Electrical Technician Project Manager  
 Steel Fixer Drivers Control room operator  
 Site Engineer Painter Engineers  
 Demolition Operative Security Staff  
 Pipe Fitter Managers General Construction  
 Cleaners Finance Chemists Operative  
 Ground Worker Environmental Safety  
 Small Plant Operator Energy Analyst  
 Scaffolder Physicists Catering Staff Estimator  
 Joiner Welder Concrete Operative  
 Industrial Safety Soil Contamination  
 Clerical Worker Maintenance technician  
 Plant operator Carpenter Plant Manger  
 Architect Heating and Ventilation Engineer  
 Quantity Surveyor Engineering Operative  
 Logistics support

**Once the power station is operational:**

Document technician  
 Communications Procurement & Supply Chain Training  
 Apprentice Graduates  
 Fuel Management Radiation Protection Technicians  
 Nuclear Safety Engineers  
 Org Learning Security Operational Crafts  
 Junior Chemistry Engineer Finance Quality Assurance  
 HR Operational Engineers  
 Engineering/Technical Roles  
 Information Management (including Com's & IT)  
 Project Management  
 Radiation Protection Engineers Nuclear Safety

**Meet Caitlin...**

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**Q. Give three benefits of being an apprentice at EDF Energy**

**A.** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

We've Got the Power!  
quick activity **KS3**

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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**A.** \_\_\_\_\_

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**Useful links**

**BBC Bitesize for Geography – Energy and resources:** <https://www.bbc.co.uk/bitesize/topics/zjsc87h>

**BBC Bitesize for Physics – Fuels and energy resources:** <https://www.bbc.co.uk/bitesize/guides/zggk87h/revision/1>

**Hinkley Point C:** <https://www.edfenergy.com/energy/nuclear-new-build-projects/hinkley-point-c>

**Starting your career in nuclear power:** [https://careers.edfenergy.com/content/Early-Careers-at-EDF-Energy/?locale=en\\_GB](https://careers.edfenergy.com/content/Early-Careers-at-EDF-Energy/?locale=en_GB)

**Different roles in wind energy:** <https://www.facesofwindenergy.com>

**Discover what happens inside a nuclear reaction in this film:** [https://www.youtube.com/watch?v=3iQBMgmg-8&list=PLXelrBe86r\\_K1Czba0ZOnMbkGChwu7pYb&index=7&t=0s](https://www.youtube.com/watch?v=3iQBMgmg-8&list=PLXelrBe86r_K1Czba0ZOnMbkGChwu7pYb&index=7&t=0s)

**Find out about early careers at EDF:** [https://careers.edfenergy.com/content/Early-Careers-at-EDF-Energy/?locale=en\\_GB](https://careers.edfenergy.com/content/Early-Careers-at-EDF-Energy/?locale=en_GB)

**Learn about some of the upcoming job roles at HPC:** <https://guest.startprofile.com/employer/19335/job-roles>

Find out more about **Hinkley Point C** and **careers in the nuclear industry**