Learning about electricity

Where does electricity come from?

Learning objectives:
KS2: Children will understand the process by which electricity can be made by burning fossil fuels or via renewable sources.
Children will explain how electricity is made verbally and via written texts.

Start learners off by:

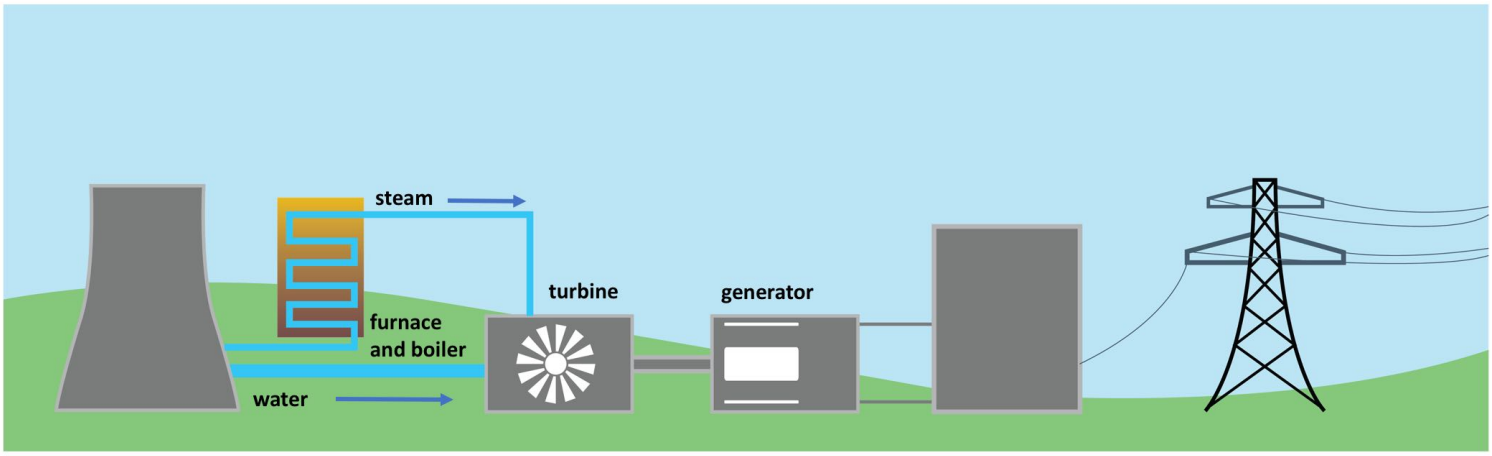
Begin by asking learners where they think electricity comes from. You may like to display some key images such as some coal, a power station, pylon, and a wind turbine. Can any of the children talk about the place these things have to play in generating electricity? Gather ideas and then watch the following video on how electricity is made
https://ypte.org.uk/videos/how-is-electricity-made

Move learners on

Most of the UKs electricity comes from burning fossil fuels. Check that learners understand what these are (coal, oil and natural gas).

In a power station, coal is crushed to a fine dust and burnt. Oil and gas can be burnt directly. The burning fuel is used to heat a large volume of water to produce steam. The steam flows at pressure to turn a turbine, a bit like a large propeller. The turbine spins at high speed - up to 3,000 revolutions per minute - and this mechanical energy is used to spin a large magnet inside massive coils of copper wire. This generates a flow of electrons, through the copper wire, which is the electricity we use in our homes, schools, etc.
The steam that has passed through the power station's turbines has to be cooled, to condense it back into water before it can be pumped round again. This is what happens in the huge "cooling towers" seen at power stations.

Fuel is burned → Water is heated to make steam → Steam turns turbines → Turbines turn generators → Electrical power



The problem with fossil fuels.
Fossil fuels are formed from the remains of ancient plants and animals, buried deep inside the Earth for millions of years. One day, we will have used up all of the reserves that we have of these fuels. They are non renewable.
When fossil fuels are burned, carbon dioxide is released into the atmosphere as a waste product. It then acts as an invisible blanket, trapping heat from the sun and warming the Earth - this is called the greenhouse effect. The more fossil fuels that are burned, the thicker the blanket becomes and the more heat is trapped. Records show that global temperatures have been rising more rapidly since the time we started burning fossil fuels in large quantities.
Scientific evidence shows that the warming of our Earth is caused by human activities, in particular the use of fossil fuels. By increasing the amount of greenhouse gases in the Earth's atmosphere we are contributing to a change that is causing it to heat up. This is called global warming.

Renewable energy sources, such as wind, water and solar power can all be used to create electricity in ways which do not require the burning of fossil fuels.

Challenge learners further:

Print out or draw symbols to represent the different parts of a power station: (In the case of a fuel powered station: energy source, heat, steam, turbine, generator, electrical power). Practise describing what each does. Work in pairs and groups to lay them out in order to build confidence.

Research types of renewable energy sources and work out how they take the place of the fossil fuel in the process. Make additional cards for different energy resources.

Use the cards as prompts to write flow charts, make posters and produce explanation texts about how electricity is made, or how a power station works. Some learners may write explanations of more specific parts of the process such as explaining how a generator works.

At the end of this activity:
All children will be able to explain that electricity is made when something (burning fuel or renewable source) turns a turbine to power a generator. The exception to this is solar PV cells! See separate lessons for explanations of how they work. They will use prompt cards to explain parts of the process.
Most children will be able to explain the process by which electricity is made by writing explanation texts.
Some children will be able to explain the pros and cons of different energy resources when writing their explanations.