

The National Grid Notes

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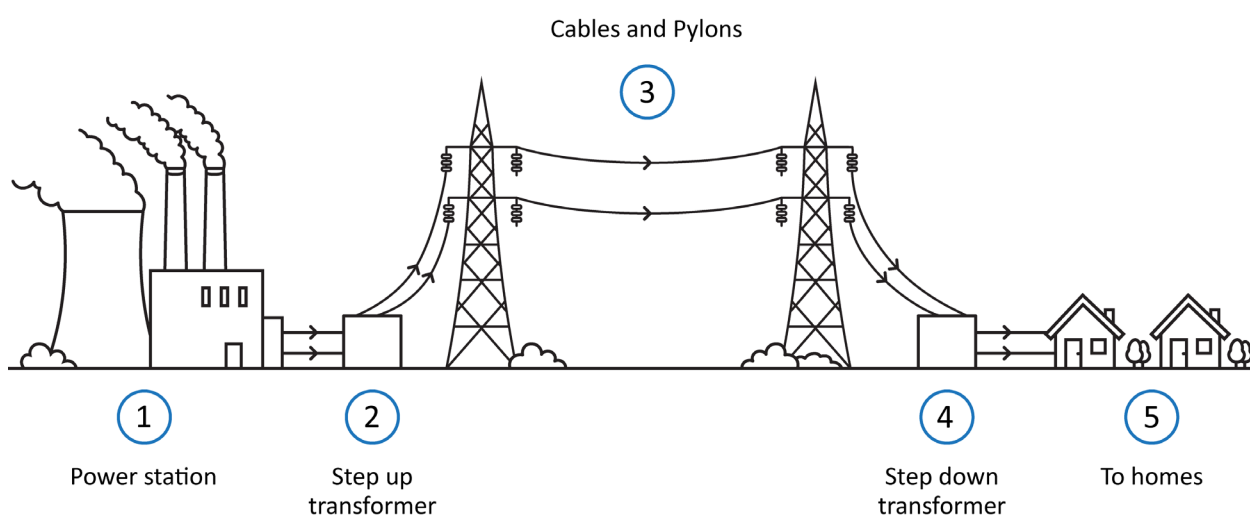
We know how to generate electricity, but how does it actually get from a power station to the charger for your phone? It travels through the National Grid! Let's look at exactly what this is.

The national grid: the network of cables, pylons (towers), and transformers.

Really important note: the power stations and homes are not considered to be part of the national grid.

The UK mains electricity supply operates as an alternating current with a voltage of 230 V and a frequency of 50 Hz.

The figure below shows a simplified version of the national grid.



Now, again, power stations and homes are not considered part of the national grid but we will still be describing them here so that we fully understand how all of this works.

How does the National Grid work? Let's follow the journey of electricity from the power station to your house step-by-step 😊

Structure 1: The power station – electricity is generated at the power station at a relatively low voltage (around 25,000 volts if you're interested).

Structure 2: Step-up transformers – before the electricity is sent across the country, it passes through a step-up transformer.

What does it do? It increases the potential difference (voltage) to around 400,000 V. Because power stays the same ($P = V \times I$), increasing the voltage causes the current to decrease massively. This means less energy is lost as heat as it moves through the cables.

Structure 3: The cables – the electricity travels across the country through thick cables held high up on pylons. It travels at a very high voltage and a very low current.

Structure 4: Step-down transformers – 400,000 V is way too dangerous to have in our homes, and it would blow up all of our appliances! So, before the electricity reaches our towns, it passes through a step-down transformer.

What does it do? It decreases the potential difference back down to a safe, usable level (230 V for UK homes). This causes the current to increase again.

Structure 5: The consumer – the electricity safely arrives at our homes, schools, and factories ready to be used!

If you need more on transformers there is a separate booklet on those 😊