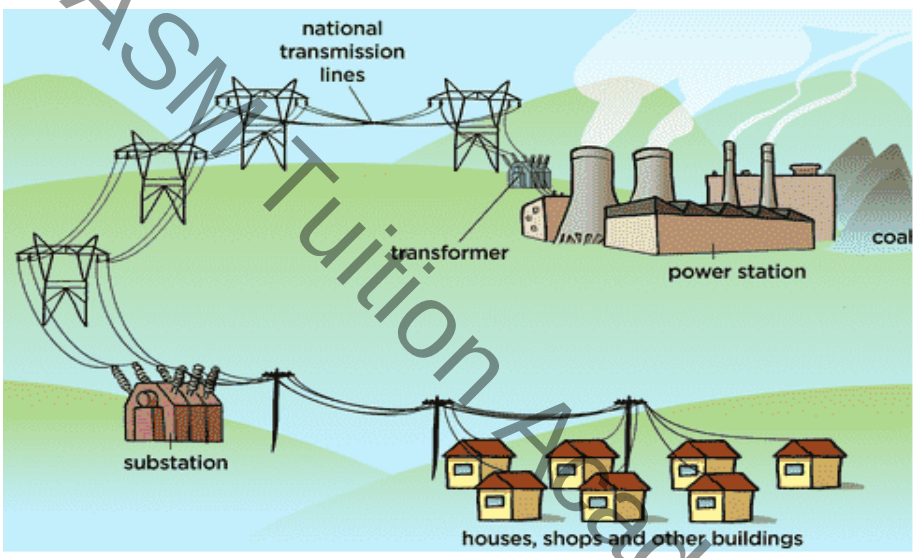
The National Grid

Transporting Electrical Energy via The National Grid

1. **Transfer of an Electrical energy:** Electricity is produces in **power stations**, but is used in other buildings, such as homes, offices and supermarkets. This is the way to transport the electrical power from the power stations to the **consumers**.
2. **Transport of Electricity by the UK National Grid:** The **UK National Grid** is able to transport the electrical energy from power stations to consumers. It does this by using a system of cables and transformers.

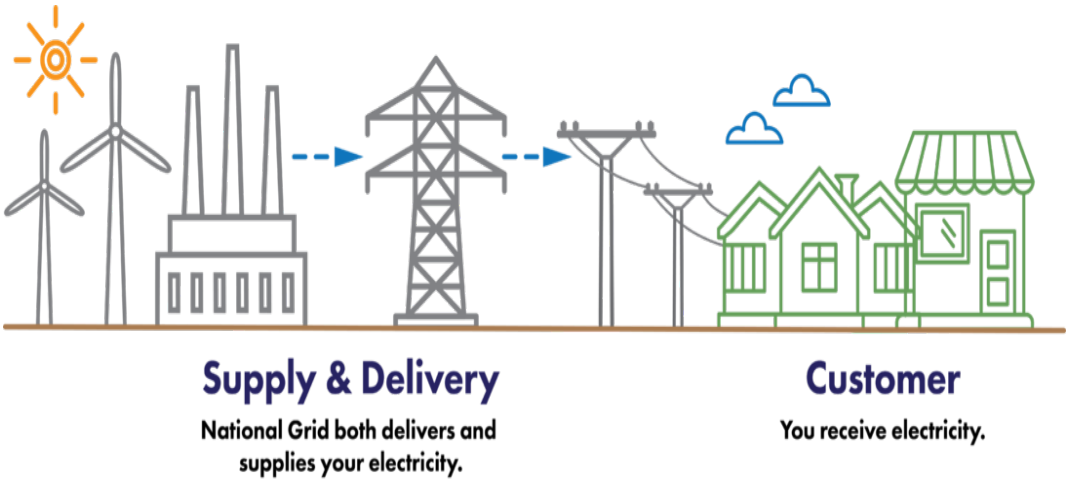


National Electric Grid

Electricity production to meet demand

- The demand for electricity varies throughout the day.

- When the demand for electricity is greater than the base load, the National Grid reacts by providing additional electricity.
- **Nuclear power stations and coal-fired power** stations usually provide base load electricity. They run all the time because they take the longest time to start up.
- **Hydroelectric power stations** have a very short start-up time and are used to provide additional electricity at peak times.
- Electricity is also imported from other European countries to meet the demand at peak. It can also be exported at other times.



Efficient Energy Transfers Via Transformers

- **Electrical energy transfers should be efficient:** When transporting so much electricity across the country, there is a huge risk of energy waste because the power is so high. Therefore, the National Grid needs to make the transfer of electrical energy as **efficient** as possible.
- The best way to produce efficient energy by Using Transformer

Transformer

- **Principal behind the Transformers:**

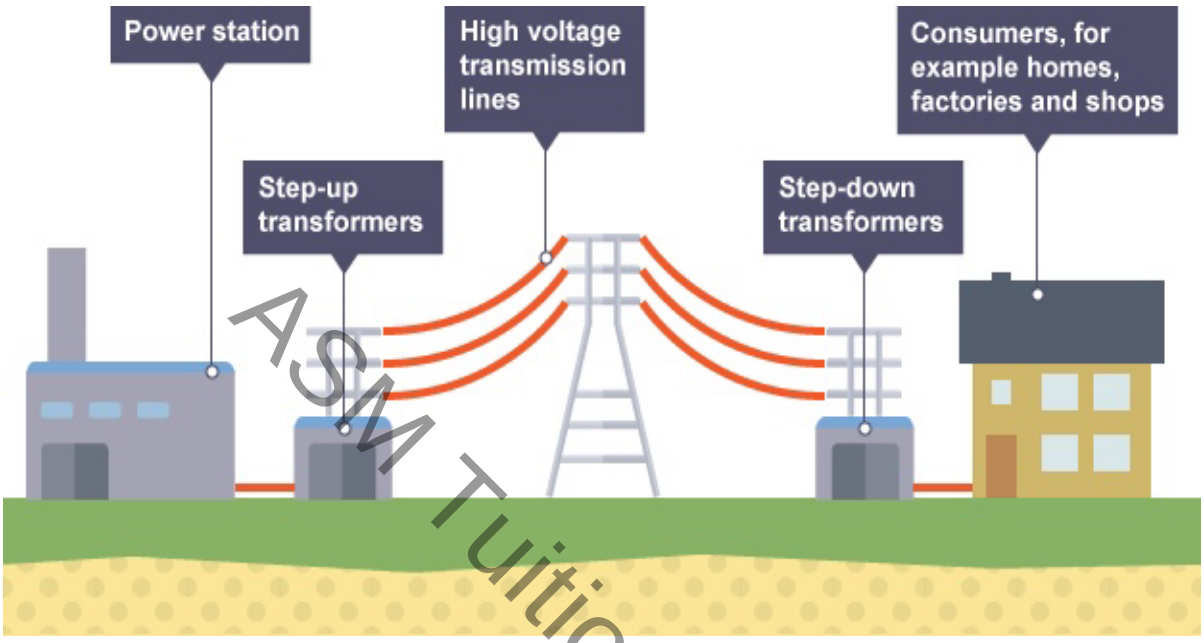
Transformer change the voltage of a circuit. Transformers used electromagnetic induction to change the voltage of a circuit. The National Grid has very high powers, meaning very high currents and voltages. During transport, we can boost the voltage very high and make the current very low, but still maintain the same power.

Types of Transformer

1. Step up transformer
2. Step down Transformer

1. **Step-up transformers are used at the start.** As soon as electricity leaves the power station, a step-up transformer increases the voltage. As resistance is constant, current falls to a very low level (V=IR). When the current is low, we are able to reduce the energy losses via heat.

2. **Step-down transformers are used at the end.** When the electricity reaches the place of use, a step-down transformer decreases the voltage and thus increases the current (since resistance is constant). The electricity can now be used in homes, offices and any other domestic use. The current is high enough to give us a good energy supply.



Difference between step up and Step down Transformer

Step up Transformer	Step down Transformer
Used to increase (step up the voltage)	Used to decrease the voltage (step down the voltage)
With the increase in voltage, there is a corresponding decrease in current	With the decrease in voltage, there is a corresponding increase in current
The secondary side has a larger number of turns	The secondary side has a smaller number of turns
The unit transformer is a type of step-up transformer	Substation transformer and distribution transformers are types of step-down transformers
Other applications involve the booster in electronic devices	Other applications involve Mobile phone charges, inverters, and voltage stabilizers