

**Renewable energy:**

A source of energy which is not going to run out. For example: Wind, Solar, Geothermal, Hydroelectric and Biomass.

**Non-renewable energy:**

A source of energy which is going to run out. For example: Coal, Oil, Natural Gas and Nuclear.

Source	Advantages	Disadvantages
<b>Wind, Solar</b>	Renewable No waste or pollution	Low power output Unreliable – dependant on the weather Considered unsightly
<b>Coal, Oil, Gas</b>	Reliable Large power output	Non-renewable Produce greenhouse gasses Cause acid rain (mainly with coal)
<b>Nuclear</b>	Reliable Large power output No greenhouse gasses	Non-renewable Long start up time Produces radioactive waste which must be stored for a long time Expensive to commission and decommission
<b>Hydroelectric</b>	Renewable Reliable Short start up time No waste or pollution	Not many suitable places for this power station Must flood a large area which affects wildlife
<b>Tidal power</b>	Renewable No waste or pollution	Must flood a large area which affects wildlife
<b>Biomass</b>	Renewable Reliable Carbon neutral	Uses a lot of crops which require a lot of land to grow

**Efficiency**

Efficiency can be calculated using this equation:

$$\% \text{ efficiency} = \frac{\text{energy usefully transferred}}{\text{total energy supplied}} \times 100\%$$

You do not need to remember the equation, it will be on the equation sheet, but it is important to choose the correct values for the equation. Useful energy is the energy you want to use from the power station and the energy supplied is the energy put into the power station.

**Thermal power station (for example Coal, Biomass, Nuclear, Geothermal)**

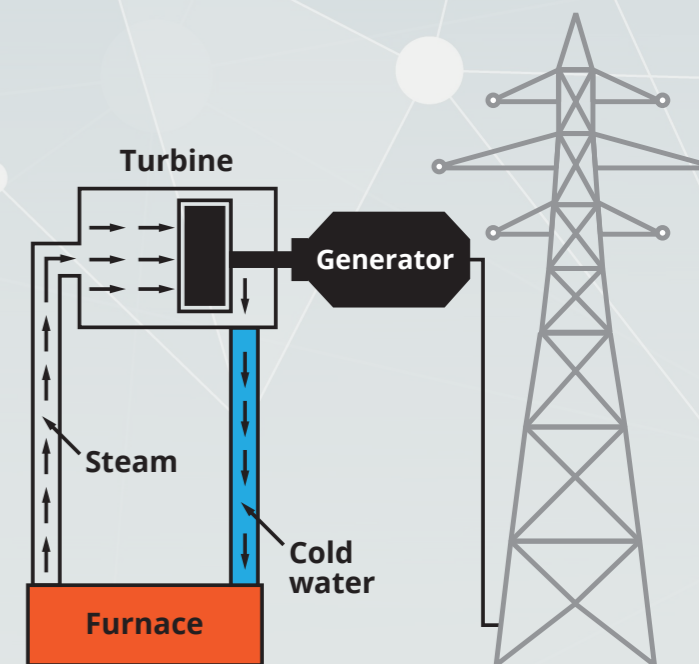
Heat is created in the **furnace** by burning a fuel, or a nuclear reaction in nuclear power.

This heat turns water to steam which moves through the pipes to the **turbine**.

This turns the turbine which in turn turns the **generator**.

This generates **electricity** which is supplied to the **National Grid**.

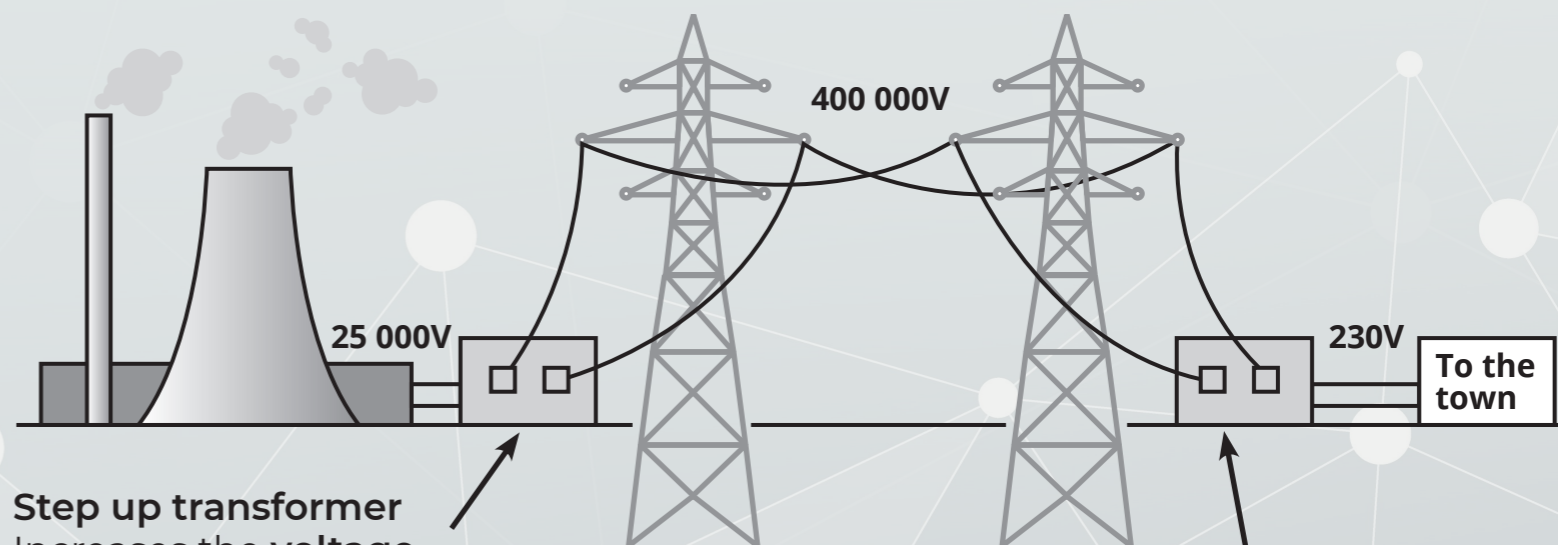
The steam is cooled and sent back to the furnace to be heated again.



**National Grid**

The National Grid is a **network** of cables which connects every power station to every home, shop, factory, school, hospital and every other consumer.

Demand for power **changes** due to the seasons, weather and time of day. For example, at the end of a popular TV programme there is a sudden demand for electricity as people put their kettles on at the same time. **To meet this demand**, the National Grid switches on extra hydroelectric power stations or buys extra electricity from abroad.



**Step up transformer**  
Increases the **voltage**, which reduces the **current** and lowers **heat losses** in the cables. This increases the grid's efficiency.

**Step down transformer**  
Lowers voltage to a **safer** level