Moving Energy – How we get our power.

Oh no! You were just watching the cutest kitten videos on YouTube when suddenly your cell phone runs out of power. You *need* to know if that kitten can finally get their head out of the roll of paper towels and your battery can not charge fast enough. While you wait for your phone to charge, have you ever wondered "Where does the power come from?".

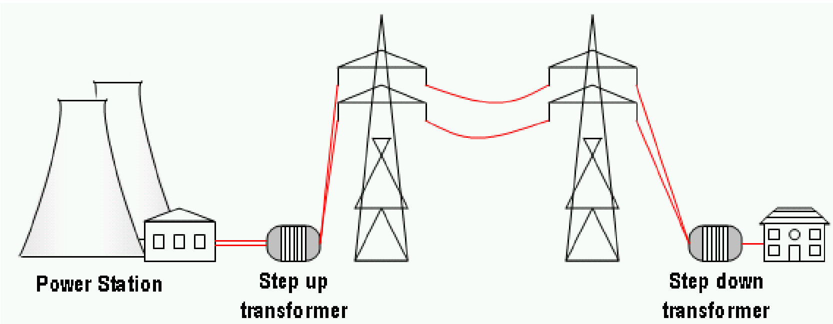


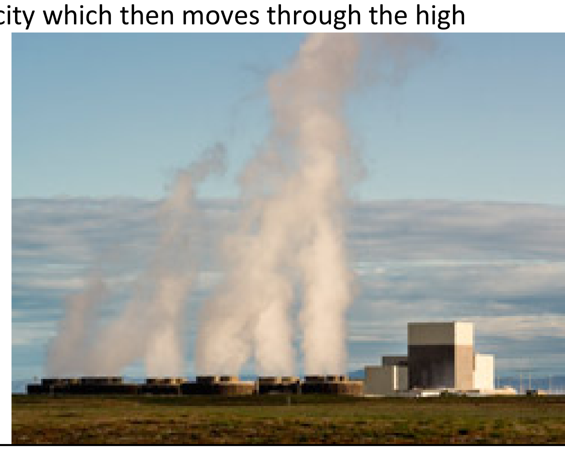
Image from: https://commons.wikimedia.org/wiki/File:Transformers_in_the_power_grid.

We use energy every day from the alarm clock that wakes us up, to the computers we use in our classrooms, and the televisions we watch at night. We depend on electricity to cook our dinner, keep our ice cream frozen, and play our favorite music. Unlike our phones and laptops our houses and schools do not have batteries attached to them. Instead they get their power from the **grid**. The grid moves electricity from places that **generate** electricity to our homes where we use the electricity.

Power plants can generate electricity from coal, natural gas, nuclear fission, hydroelectric dams, solar panels, or wind turbines. The power made by these sources are transformed into **high voltages** using a **step up transformer.** A step up transformer takes a lower voltage and turns it into a higher voltage electricity which then moves through the high voltage wires without losing a lot of power along the way.

However, if we tried to plug our phone into a high voltage outlet, the voltage would overload the circuits and would destroy our phones. In order to use the electricity generated by the power plants, we need to transform the power from high voltage to low voltage through a **step down** transformer.

The first place where the voltage is lowered is at a power substation. Here the voltage is lowered and then distributed in different directions to take power to different neighborhoods. Sending the power out in multiple directions prevents entire communities from losing power if the company needs to repair one line. Instead, a small area of the community will be out of power during the repair.



Columbia Generating Station, Richland, WA
https://www.nrc.gov/info-finder/reactors/wash2.html.png

Finally the electricity passes through another step down transformer outside your house. Once the voltage is low enough to not harm the circuits in our electronics, wires take the electricity from the transformer to our houses. Before the electricity reaches the power outlets in the wall, we make it go through a **fuse box**. The fuses are designed to break if the wires bring in power that is too strong in order to prevent electrical fires and protect the electronics from being destroyed. Finally, the devices in our house serve as the **load** or the part of the circuit that consumes electricity. Batteries serve as **storage** for the electricity to hold a small amount of electricity until we are ready to use it. Someday a computerized **Smart Grid** will manage supply and demand to make the system more efficient and resilient.

Check your understanding:

What do we call the system that moves power from power plants to our houses?

Why do we move electricity in high voltages instead of the voltages we use for our household electronics?

Will an entire city lose power if one power line breaks?

Name three examples of ways we can generate electricity.

Is the transformer outside of your home a step up or step down transformer?