BBC BITESIZE

The AC generator

Dr George Dransfield: The AC generator is how this wind turbine generates electricity.

Wind spins the turbine blades, which then spin sets of coiled wires between the poles of stationary magnets, as you can see in this diagram of an AC generator.

The orange lines represent magnetic field lines.

The coils cut through the magnetic field and induce a potential difference across the wires, which then creates an electric current represented by these green dots.

As the coil spins, one side of it first moves up through the magnetic field, then moves down on the other side.

The change in direction through the magnetic field reverses the induced potential difference across the coil.

This causes the electrical current to reverse direction.

This occurs every half turn of the coil.

The current that's produced is called Alternating Current (AC), because it's constantly changing direction.

To maintain a circuit, brushes ensure contact is always kept with slip rings, so current can flow through the rest of the circuit.

If you plot the potential difference output over time, you get a sine wave.

Let's look at how we do this step by step.

When vertical, as illustrated on this mini diagram, the coil is moving parallel to the magnetic field.

It's not cutting through any magnetic field lines, so the potential difference across the coil is zero.

A quarter turn later, the coil is horizontal and cutting through the maximum number of field lines, so potential difference is at its maximum.

As the coil continues to spin, potential difference drops to zero, then increases to maximum in the opposite negative direction, before returning to zero at the end of a full 360 degree rotation.

Just remember that each complete 360 degree rotation creates one full sine wave.

It's amazing that AC generators attached to wind turbines can generate electricity.

(MUSIC)