

Electricity

Electricity refers to the movement of tiny subatomic particles called electrons.

Electric current always flows in a circuit from the positive terminal to the negative terminal.

Electricity is measured in amps (A) or milliamps (mA).

- 1 A = 1000 mA

Voltage

Each power source has voltage. Voltage is the ability to move electrons around the circuit. An electric current results from a voltage between two points.

The unit of voltage is the volt (V) or millivolt (mV)

- 1 V = 1000mV

Electricity Generation

Electricity has to be generated, stored and distributed before it can be utilised. Most electrical energy in Ireland is produced in thermal power plants which convert chemical energy in fossil fuels to electrical energy.

Renewable sources of energy are becoming more popular in recent years. Wind turbines, Hydroelectric power and solar farms are examples of this.

Electric Generators

In electric generators wire coils are placed in a magnetic field and rotating turbines then turn these coils. The coils turning in a magnetic field creates an electric current that flows in the coils. In this process kinetic energy is converted into electrical energy.

The reverse happens in motors - electrical energy is converted into chemical energy.

Solar Cells (Photovoltaic Cells)

Photovoltaic cells convert light energy into electricity. This form of energy generation is often used in scenarios where power from the electrical grid is unavailable such as spacecraft, satellites, and remote research stations.

The Electric Grid

The electricity grid transmits electric power from the power station where it is generated, to our homes and businesses where it is used. The grid consists of a network of power plants and transmission lines. The grid allows for electrical power to be transmitted effectively between areas of power surplus and power shortage.

Steps involved in Electrical Distribution:

1. Electricity is generated in the power station
2. The current generated is transferred to substations in high voltages
3. In the substation the voltages are changed to lower domestic levels using transformers
4. The electricity is then transferred to your home via power lines. These power lines can be either above ground or below ground
5. When the electricity arrives to your premises it is usually split into different circuits around the premises
6. When you turn on the electrical appliance it is then powered by this electrical current

Measuring and Testing Electricity

Voltmeter - measured the difference in voltage between two points in a circuit

Ammeter - measures the electric current in a circuit

Multimeter - can measure electrical current, resistance, voltage and more

Alternating Current vs Direct Current

Alternating current is the mains electricity supplied to homes and businesses. The direction of the current is constantly changing.

AC can be distributed more cheaply over long distances than DC

Direct current flows in the same direction. DC is usually a lower voltage than AC. Most devices than run on DC will require an adaptor to change the mains electricity from AC to DC in order to work. Batteries supply a DC voltage.

Frequency is a measure of how often a sine wave (AC Cycle) repeats. Mains voltage completes on cycle 50 times a second, meaning it has a frequency of 50 hertz.