



**Knowledge and Understanding to be developed:**

This topic covers the functions of fuses and other devices which are designed to prevent current flow when faults develop in domestic circuits. It introduces the concept of the ring main circuit and explains the functions of the live, neutral and earth wires. It compares the cost effectiveness of using different renewable energy sources such as solar and wind energy to supplement the user's needs in the domestic situation.

**Mathematical Skills** There are a number of opportunities for the development of mathematical skills in this topic. These include applying the equations relating units used, power and time to calculate the cost of electrical energy; determining the efficiency of energy transfer, e.g. whilst using an electric kettle. These topics afford learners the opportunity to use ratios, fractions and percentages; to change the subject of an equation; to substitute numerical values into algebraic equations using appropriate units for physical quantities; to solve simple algebraic equations; to construct and interpret tables and diagrams.

**Key Terms to be learned this topic:**

- |           |               |
|-----------|---------------|
| cost      | alternating   |
| direct    | payback       |
| renewable | Non renewable |
| domestic  |               |

**Learning Objectives and Outcomes:  
Students should be able to :**

- (a) the kilowatt (kW) as a convenient unit of power in the domestic context and the kilowatt hour (kWh) as a unit of energy
- (b) the cost of electricity using the equations:  
units used (kWh) = power (kW) × time (h)  
cost = units used × cost per unit
- (c) how data can be obtained either directly or using secondary sources (e.g. through the energy banding (A-G) and the power ratings of domestic electrical appliances) to investigate the cost of using them
- (d) the difference between alternating current (a.c.) and direct current (d.c.)
- (e) the functions of fuses, miniature circuit breakers (mcb) and residual current circuit breakers (rccb) including calculations of appropriate fuse ratings
- (f) the ring main, including the functions of the live, neutral and earth wires
- (g) the cost effectiveness of introducing domestic solar and wind energy equipment, including fuel cost savings and payback time by using data
- (h) how to investigate energy transfers in a range of contexts including interpreting and analysing data; evaluation of validity of the data and methods, e.g.
  - the energy output from a renewable source (e.g. wind turbine: construction and location)
  - efficiency of energy transfer (e.g. using an electric kettle)