Energy

Energy is measured in **Joule**.

1 Joule is the amount of energy needed to exercise a force of **1 Newton** over a distance of **1 meter**.

Power

Power is the amount of **energy (Joule)** converted from one form to another in **1 second**.
E.g.: In a light bulb *electrical energy* gets converted into *light* and *heat energy*.

Power is measured in: **Watt (W)**
1 000 W = 1 kW (kilowatt)

For example, the power of different light bulbs differ:

In a light bulb of 100 Watt power marked 100 W –
100 Joule of energy is converted from electrical energy to light energy and heat energy in 1 second.

In a light bulb of 60 Watt power marked 60 W –
60 Joule of energy is converted from electrical energy to light energy and heat energy in 1 second.

$$\text{Power (W)} = \frac{\text{Energy (J)}}{\text{Time}}$$

and therefore

$$\text{Energy (J)} = \text{Power (W)} \times \text{Time}$$

Energy Consumption in the Home:

Because we use so many electrical appliances in our homes every day, a large amount of electrical energy is consumed. For practical reasons we measure the **power (W)** of appliances in **kilowatt (kW)** and the time for which they are used, in **hours (h)**. Thus the amount of energy consumed is measured in **kilowatt-hour (kWh).**

Municipalities measure and sell our electrical energy consumption in kilowatt-hour (kWh). **1 kWh** is often referred to as **1 'unit'** and costs approximately R1.80.
In other words, for every 1 hour I use my 1 000 W toaster or other appliance, it costs me R1.80.

Energy (J) = Power (kW) x Time (h) = kW x h = kWh

Practical Assignment:

In South Africa energy is mainly generated by burning fossil fuels (e.g. coal). Burning fossil fuels produces CO_2 (carbon dioxide) – a greenhouse gas. Excessive release of CO_2 causes global warming, resulting in climate change.
Electricity generated by burning coal causes almost 0.915 kg of CO_2 /kWh to be released.
In other words, for every 1 hour I use my 1 000 W toaster, almost 1 kg of CO_2 is being released into the atmosphere.

1. Select any 10 electrical appliances in your home and complete the table below over a period of 5 days.

Electrical Appliance	Qty	Power		Usage time per day in hour (h)	Energy consumption per day in kWh	No. of days	Total Energy consumption in kWh
		Watt (W)	Kilowatt (kW)				
Light bulb	1	100	100 1000 = 0,1	30min 60min = 0,5h	0,1kW x 0,5h = 0,05kWh	5	0,05kWh x 5days = 0,25kWh
Kettle	1	1600	1600 1000 = 1,6	48min 60min = 0,8h	1,6kW x 0,8h = 1,28kWh	5	1,28kWh x 5days = 6,4kWh

2. Using a bar graph, indicate which appliances consume the most energy.

3. Indicate the total amount of kWh consumed.

4. If one unit (1 kWh) costs R1.80 – what is the cost of the total amount of electrical energy that has been consumed?

5. Now determine the total amount of CO_2 that had been released in order for you to use the above appliances.

6. Name the primary fossil fuels used today.

7. What should be changed on the table to result in the release of less CO_2?

8. Could you suggest other ways in which one could reduce the release of CO_2 gases?