



ENERGY

Energy is the ability to do work. Electricity generated at power stations is used every day in our homes, schools, or workplaces. There are RENEWABLE and NON-RENEWABLE energy resources.

WHAT IS RENEWABLE ENERGY?

These energy resources do not run out, and are therefore mostly more environmentally friendly than non-renewable resources.

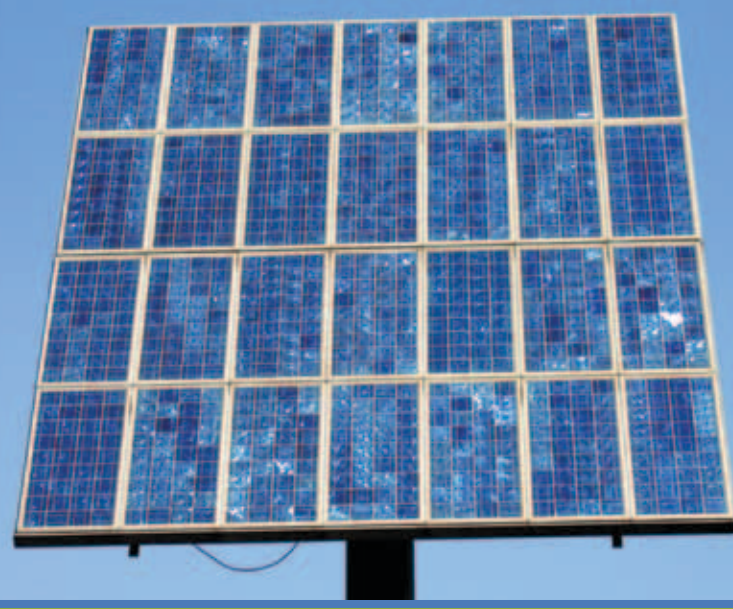
WIND



Wind causes the blades of a wind turbine to turn and a generator inside the turbine produces electricity.

- Little pollution produced (but some from the manufacturing of the windmills). 🇱🇪
- Birds and bats are sometimes killed by the turbines. 🇱🇪
- Not everyone likes the look of wind turbines. 🇱🇪
- Only suitable in an area where there is a lot of wind. Also, the wind does not blow all the time. 🇱🇪

SOLAR



A solar farm is made up of many solar panels or mirrors which catch sunlight and convert it into electricity.

- Little pollution produced (but some from the manufacturing of the solar panels). 🇱🇪
- No noise produced. 🇱🇪
- Lots of water is needed to clean panels and mirrors. 🇱🇪
- No sun at night and on cloudy days. 🇱🇪

BIOMASS



This is energy obtained from plants and animals, such as wood, straw, sugar cane mulch, sewage or household waste. When this is burnt, heat and electricity is produced.

- Cheap and uses waste materials. 🇱🇪
- Produces greenhouse gases and pollution. 🇱🇪
- Uses a lot of space that could be used for growing food crops. 🇱🇪
- Not dependent on the weather and time of day. 🇱🇪

HYDRO



Hydro-energy generates electricity from the movement of water (such as waves, tides, or rivers).

- Tidal and wave facilities may impact marine life. 🇱🇪
- Dams reduce the water in a river and affect its ecology. 🇱🇪
- When dams are built, land is flooded and communities are displaced. 🇱🇪
- Although hydro is classified as a 'renewable' resource, fresh water is a scarce resource in a dry country such as ours. 🇱🇪

WHAT IS NON-RENEWABLE ENERGY?

These energy resources will eventually run out and cannot be replaced. They cause more pollution and are more harmful to the environment than renewable resources.

COAL



Coal is mined and then burnt in power stations to make electricity.

- Cheap source of energy and South Africa has lots of coal. 🇱🇪
- Produces a lot of air and water pollution. 🇱🇪
- Health and safety risks for workers and nearby communities. 🇱🇪
- Coal will run out in 100 years! 🇱🇪

OIL



Oil is found deep below the sea or land. Huge drills are needed to reach the oil, which is then transported to places where it is refined into fuel and other products.

- Construction of the oil platforms or rigs, as well as spillages impacts marine life. 🇱🇪
- Produces air, noise and water pollution. 🇱🇪
- Health and safety risks for workers and nearby communities. 🇱🇪

GAS



Natural gas is found deep underground and is converted into electricity or other products. Fracking is the process of blasting pressurised water, industrial additives and sand down a well to release natural gas.

- Removal of the gas from underground needs a lot of water. 🇱🇪
- Leads to water contamination and air pollution. 🇱🇪
- There is an increased risk of fires or explosions. 🇱🇪
- May cause health impacts for communities. 🇱🇪

NUCLEAR



Nuclear energy is made from radioactive uranium ore found under-ground. Heat energy is created when the uranium atoms are split (through a process called nuclear fission) and converted to electricity.

- Mining of uranium requires large amounts of water and is very toxic for nearby communities. 🇱🇪
- There are lots of questions about safety. 🇱🇪
- Nuclear waste is radioactive and remains harmful for thousands of years. 🇱🇪

FOSSIL FUELS AND SOUTH AFRICA'S CARBON EMISSIONS

Burning fossil fuels (such as coal and oil) releases greenhouse gases such as carbon dioxide (CO₂) into the atmosphere. Renewable energy sources such as wind, hydro and nuclear do not give off gases directly, but their construction also releases small amounts of greenhouse gases.



CO₂ EMISSIONS FROM DIFFERENT ENERGY SOURCES (grams of CO₂ equivalent per kilowatt hour)

ACTIVITY

HOW MUCH CARBON ARE YOU USING AT HOME OR IN THE CLASSROOM?

The units of power are Watts (W), Kilowatts (kW) or Kilowatt Hours (kWh). Different appliances use different amounts of power in the form of electricity. The wattage for most appliances is usually stamped on an appliance. The table below shows some averages:

APPLIANCE	WATTS (POWER)	APPLIANCE	WATTS (POWER)
Clock radio	10	Fridge	725
Window fan	55 - 250	Microwave	750 - 1100
TV	65 - 133	Toaster	800 - 1400
Radio	70 - 400	Vacuum Cleaner	1000 - 1440
Light bulb	100	Clothes iron	1000 - 1800

- To calculate the total power used per day you need to work out how many hours each appliance is left on for, for example: (Wattage x Hours used per day) ÷ 1000 = Daily Kilowatt-hour (kWh) consumption.
- For a toaster, this would be: (800 Watts x 1 hour/day) ÷ 1000 = 0.8 kWh.
- Do this for all your appliances used in the home and add them together to get the total amount of energy consumed per day.
- Since South Africa uses mostly coal for energy, multiply your answer obtained by 900 grams of CO₂ per kWh. For the toaster only, this would be: 0.8 kWh x 900 g of CO₂ per kWh = 720 g of CO₂ emitted per day.
- Instead of multiplying by 900, use the amount of CO₂ emitted for the other types of energy. This way you can work out how much CO₂ would be saved if South Africa were to switch to renewable energy!

