

Coal

- 1.1 Fully explain the process by which coal is formed. (9)

Plants grew near water ✓. They died and fell into the water ✓. They were covered by sand and mud ✓. The wood turned into peat ✓. More layers of soil caused more pressure so that gas ✓ and water ✓ were squeezed out of the peat. This hardened layer is called lignite ✓. Over millions of years ✓ more layers of sand and mud covered the lignite which eventually became coal ✓.

- 1.2 From the list below, identify 5 places where coal is mined in South Africa. (5)

Knysna, Upington, **Witbank**, Cape Town, **Newcastle**, **Vryheid**, Durban, **Dundee**, **Sasolburg**



- 1.3 Give the **two** main disadvantages of coal usage. (2)
It is a **non-renewable resource**, **pollution**

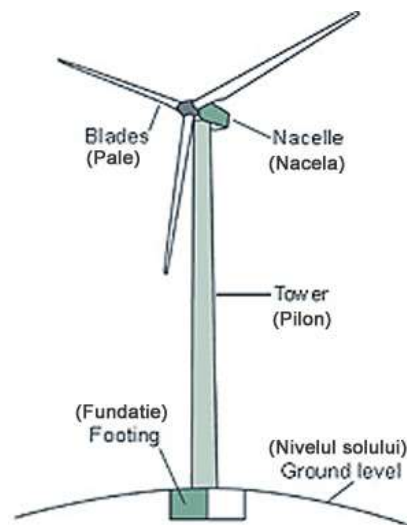
Renewable Energy

- 2.1 List **six** examples of renewable energy sources. (6)
biomass, water, geothermal, wind, solar, tidal

- 2.2 What is most of renewable energy used for? (1)
To produce electricity.

- 2.3 If renewable energy is so much better for the planet than fossil fuels, why are we not using more of it? Give **three** reasons. (3)
- **It is more expensive to produce than fossil fuels**
 - **It is located in remote areas.**
 - **It is expensive to build power lines from remote areas to the cities.**
 - **It is not always available e.g solar on cloudy days, wind on still days**
- 2.4 Explain how biomass fuels are used to produce electricity. (4)
The fuel is burned√ – heats water√ – into steam√ – drives turbines√ – produces electricity
- 2.5 Write a paragraph in which you include **five** facts that you learnt about electricity and/or nuclear energy on our outing to Koeberg Nuclear Power Station. (5)
- 2.6 Read the following excerpt and answer the questions that follow. You may use a dictionary.

A wind turbine, windmill or wind generator is a device for converting [wind](#) power to mechanical rotation with a low velocity [turbine](#) designed for compressible fluids



Location is Critical

Wind generators are impractical in many areas. The available power grows as the cube of the average wind speed. A site with prevailing winds of 30 kph is eight times as valuable as a site with only 15 kph. As a general rule, wind generators are practical where the average windspeed is greater than 19 kph.

The normal way of prospecting for wind-power sites is to look for trees or vegetation that is permanently "cast" or deformed by the prevailing winds. Another way is to use a wind-speed survey map, or historical data from a nearby meteorological station, although this is less reliable.

In typical land-based installations, a tower lifting the bottom of the turbine 30 meters will pay for itself by placing the turbine in faster air.

In areas with dramatic topography, moving a generator 30m can sometimes double its output. Often the winds are monitored and modeled before wind generators are installed.

Wind power is practical in most areas of the North American great plains, and the central Eurasian plains, as well as selected ridges of major mountain-chains. Some authorities claim that the mountain ridges alone have enough wind energy to power their respective continents. In areas with storms, it often practical to replace or supplement solar cells with a wind-gnerator. The greatest reservoir of wind energy is in the open oceans, especially around 40 degrees south.

2.6.1 How can a suitable location for a wind-power site be found? (3)

Look for trees or vegetation that has changed shape and become damaged[√] by winds. Alternatively, look at windsurvey maps[√] or historical data[√] from meteorological stations.

2.6.2 Explain how lifting the bottom of a turbine by 30m can be highly beneficial. (2)

By lifting a turbine the blades are exposed to faster moving air[√], thereby increasing the amount of energy generated[√].

Energy

3. What two pieces of equipment are needed to generate an electrical current? (2)

A magnet, (copper) wire.

4. Design a form of transport that uses a renewable source of energy. Label your diagram. (3)

Any design using a renewable source of energy.

√ For using a renewable source of energy.

√ For a feasible idea. Could it work?

√ Explanatory label