NAME _____ CLASS _____

RENEWABLE OR NOT?

Renewable energy sources will not run out, because nature keeps replacing them – the wind keeps blowing and the sun keeps shining.

Non-renewable sources are being used up faster than they can be replaced. Once we have used them, they are gone. Coal, oil and gas are called **fossil fuels**.

1 Sort these energy sources into the correct column. 10 marks

WORD BANK Coal | Wind | Natural gas | Solar | Nuclear (uranium) | Hydro-electric | Oil | Tidal | Wave | Biomass (wood pellets)

RENEWABLE	NON-RENEWABLE

2 Nuclear power stations do not burn fuel and release very little carbon dioxide. Explain why nuclear is still classed as **non-renewable**. 2 marks

3 Most power stations spin a **turbine** connected to a **generator**. Number the steps for a simple gas-fired steam power station in the correct order (1–6). 6 marks

- [ ] The turbine spins the generator, which produces electricity.
- [ ] Gas is burned to release heat.
- [ ] Electricity is sent out to the National Grid.
- [ ] The heat boils water to make high-pressure steam.
- [ ] The steam pushes on the blades of a turbine and makes it spin.
- [ ] Gas is delivered to the power station by pipeline.

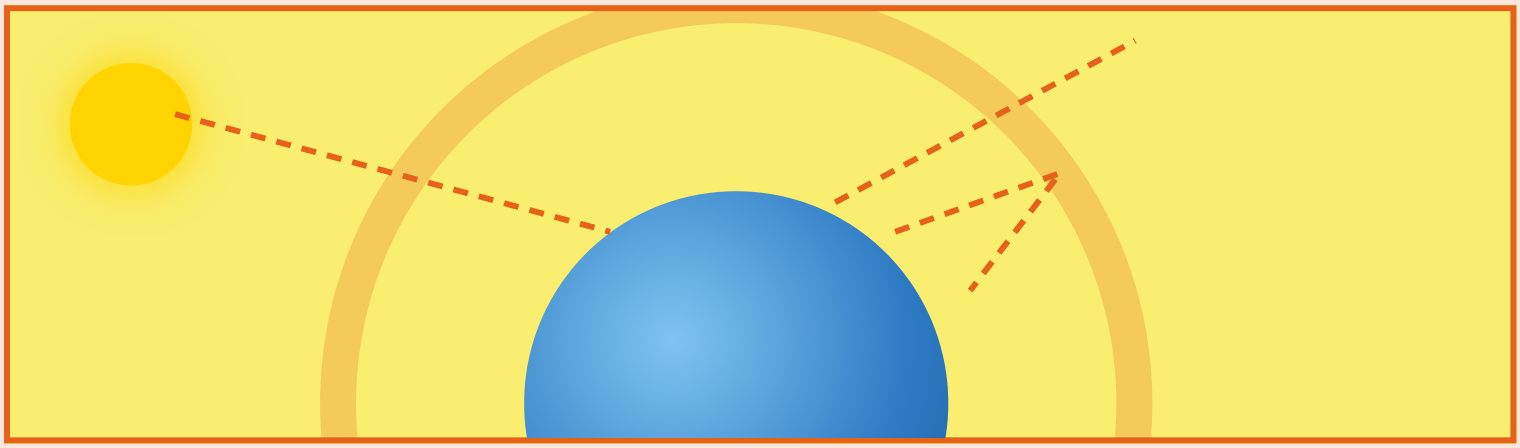
DID YOU KNOW? Peterhead Power Station in Aberdeenshire burns natural gas. Like many modern gas stations it is 'combined cycle': a gas turbine spins first, then its waste heat makes steam for a second turbine. Just off the coast, Hywind Scotland was the world's first floating offshore wind farm.

ENERGY AND THE ENVIRONMENT

Burning fossil fuels releases **carbon dioxide (CO_2)**. CO_2 is a **greenhouse gas**. It traps heat in the atmosphere, a bit like a blanket around the Earth.

More greenhouse gases trap more heat. This is causing the Earth's average temperature to rise. This is called **global warming**, and it is changing our climate.

4 Complete the diagram. Label: **Sun**, **heat escaping to space**, **heat trapped by greenhouse gases**, **atmosphere**. 4 marks



5 Choose **two** ways of generating electricity. For each, give one advantage and one disadvantage. 4 marks

METHOD 1:

METHOD 2:

6 Wind and solar power do not work all the time. Suggest **one** way engineers can make sure we still have electricity when it is calm or dark. 2 marks

7 **CHALLENGE** Scotland has set itself a target to reach **net zero** greenhouse gas emissions by 2045. Explain what an engineer could do to help. 3 marks