

Exercise walk-through

Nuclear Power ■ 6.6

eXercise

You must be able to

- describe **nuclear fission** 核裂变 to generate electricity
- state advantages (no CO₂, high energy density)
- state disadvantages (radioactive waste, accidents)

Method — How it works

Nuclear power splits uranium atoms (**fission**), releasing huge heat that boils water to spin a turbine — generating electricity, like a steam plant but with a nuclear heat source.

Method — Advantages

- Produces **no CO₂** during operation (helps climate).
- **Very high energy density** — a tiny amount of fuel yields a lot of energy.
- Reliable “baseload” power.

Method — Disadvantages

- **Radioactive waste** stays dangerous for thousands of years and must be stored safely.
- Risk of **accidents** (Chernobyl, Fukushima) releasing radiation.
- High cost and **thermal pollution** of cooling water.
- Uranium is **nonrenewable**.

Method — A worked judgement

Nuclear power is low-carbon and energy-dense, but the long-lived waste and accident risk make it controversial.

Practice 2.1 ■ 1 mark

What process generates the heat in a nuclear plant?

Solution 2.1

Method: How it works

Worked steps

Nuclear fission (splitting uranium atoms) **B1**.

Practice 2.2 ■ 1 mark

State one advantage of nuclear power.

Solution 2.2

Worked steps

Any one: no CO₂, high energy density, reliable **B1**.

Practice 2.3 ■ 1 mark

State one disadvantage.

Solution 2.3

Worked steps

Any one: radioactive waste, accident risk, high cost, thermal pollution **B1**.

Exam-style 3.1 ■ 1 mark

A climate advantage of nuclear power is that it

A produces no CO₂ during operation

B burns coal

C releases methane

D needs no fuel

Solution 3.1

A produces no CO_2 during operation



B burns coal

C releases methane

D needs no fuel

Worked steps

A — produces no CO_2 during operation.

Exam-style 3.2 ■ 2 marks

A country considers building nuclear plants to cut carbon emissions.

- (a) State one benefit and one drawback.
- (b) Explain the main challenge of nuclear waste.

Solution 3.2

Method: A worked judgement

Worked steps

(a) Benefit: low-carbon, energy-dense power; drawback: radioactive waste or accident risk **B1 B1**. (b) The waste stays radioactive and dangerous for thousands of years, so it must be stored safely for a very long time **M1 A1**.

Exam-style 3.3 ■ 2 marks

Explain why nuclear power is low-carbon but still not fully renewable.

Solution 3.3

Method: A worked judgement

Worked steps

It emits no CO₂ during operation, but its fuel (uranium) is a finite mined element, so it is nonrenewable **M1** **A1**.