

Exercise walk-through

6.9

Hydroelectric Power

AP Environmental Science

Nuclear power

Nuclear power uses **fission** : a neutron splits a uranium nucleus, releasing huge heat.

- almost no **greenhouse gas**
- but **radioactive waste** lasts 10,000+ years

Low-carbon and steady, but waste storage and accidents are the risks.



Nuclear: steady low-carbon power, long-lived waste

What each renewable costs you

photovoltaic

clean and falling in price, but needs a **large area** and produces nothing at night

wind

clean and cheap to run, but **intermittent**, and siting raises noise and wildlife objections

hydroelectric

reliable and low-emission, but the **reservoir** **floods land** and blocks fish migration

geothermal

renewable and steady, but only where the heat is near the surface

biomass

carbon-neutral *if* replanted; **ethanol** from corn or cane adds no new carbon but competes with food

Every one of them trades a fossil-fuel problem for a land, timing or siting problem. Naming that trade is the answer.

Check yourself

- 1 About what share of world energy is fossil fuels?
- 2 What process powers a nuclear plant?
- 3 Why do solar and wind need backup?
- 4 What is the only byproduct of a hydrogen fuel cell?



80%

Answers 1. about 80% 2. nuclear fission 3. they are intermittent 4. water

Exercises 2.1-2.3

2.1 What spins the turbines in a hydroelectric plant?

[1]

2.2 State one advantage of hydroelectric power.

[1]

2.3 State one disadvantage.

[1]

Exercises 2.1-2.3

2.1 What spins the turbines in a hydroelectric plant?

[1]

2.1

- Falling/flowing water (from the dam)
-

2.2 State one advantage of hydroelectric power.

[1]

2.2

- Any one: renewable, no CO₂, reliable, water storage/flood control
-

2.3 State one disadvantage.

[1]

2.3

- Any one: floods habitat, displaces people, blocks fish, traps sediment

Exercise 3.1

3.1 A major ecological drawback of a large dam is that it

[1]

☐

A produces CO_2

B blocks fish migration and floods habitat

C uses fossil fuels

D cannot store water

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3.1 B

- blocks fish migration and floods habitat

Exercise 3.2 (a)

3.2 A country builds a large dam for electricity.

(a) State one benefit and one environmental cost.

[2]

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(a)

- Benefit: clean, reliable, renewable power; cost: flooded habitat / displaced people / blocked fish

Exercise 3.2 (b)

3.2 A country builds a large dam for electricity.

(b) Explain how the dam affects fish and sediment.

[2]

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(b)

- The dam blocks migrating fish (unless fish ladders exist) and traps sediment, starving downstream areas of nutrients

Exercise 3.3

3.3 Explain why hydroelectric power is renewable and low-carbon.

[2]

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3.3 Explain why hydroelectric power is renewable and low-carbon.

[2]

3.3

- It uses the water cycle (endlessly replenished by rainfall) to generate power and burns no fuel, so it emits no CO₂ during operation