Exercise walk-through

Energy from Biomass ▪ 6.7

eXercise

You must be able to

- describe **biomass** 生物质 energy (wood, crops, biofuels)
- explain that it is renewable but has impacts
- discuss carbon neutrality and air pollution

Method — Biomass energy

Biomass is energy from organic material — burning **wood**/crop waste, or making **biofuels** (ethanol from corn, biodiesel). It is **renewable** if replanted.

Method — Carbon (near-)neutral

Growing biomass **absorbs $\mathbf{CO_2}$**, and burning it **releases** the same CO_2 back — so it can be roughly **carbon neutral** over its cycle (unlike fossil fuels, which add ancient carbon).

Method — Disadvantages

- Burning still releases **air pollution** (particulates).
- Growing biofuel crops competes with **food** production and can drive land clearing.
- Only sustainable if regrown as fast as used.

Method — A worked judgement

Ethanol from corn is renewable and near carbon-neutral, but growing the corn uses land, water, and fertilizer and competes with food.

Practice 2.1 ▪ 1 mark

Give one example of biomass energy.

Solution 2.1

Method: Biomass energy

Worked steps

Any one: burning wood/crop waste, ethanol, biodiesel B1.

Practice 2.2 ▪ 1 mark

Why can biomass be roughly carbon neutral?

Solution 2.2

Method: Carbon (near-)neutral

Worked steps

Growing it absorbs the same CO_2 that burning releases B1.

Practice 2.3 ▪ 1 mark

State one disadvantage of biofuel crops.

Solution 2.3

Method: Disadvantages

Worked steps

Any one: competes with food, uses land/water/fertilizer, air pollution B1.

Exam-style 3.1 ▪ 1 mark

Biomass can be considered carbon neutral because growing it

A releases CO_2

B absorbs the CO_2 that burning releases

C produces no gases

D uses fossil fuels

Solution 3.1

Method: Carbon (near-)neutral

A releases CO_2

B absorbs the CO_2 that burning releases ✓

C produces no gases

D uses fossil fuels

Worked steps

B — absorbs the CO_2 that burning releases.

Exam-style 3.2 ▪ 2 marks

A country grows corn to make ethanol fuel.
(a) State one benefit and one drawback.
(b) Explain why biomass is renewable only if managed well.

Solution 3.2

Method: Biomass energy

Worked steps

(a) Benefit: renewable and near carbon-neutral; drawback: competes with food or causes air pollution B1 B1. (b) It is renewable only if the plants are regrown as fast as they are burned; otherwise the resource is depleted M1 A1.

Exam-style 3.3 ▪ 2 marks

Explain why burning biomass is often considered better for the climate than burning coal.

Solution 3.3

Worked steps

Biomass returns recently-absorbed CO_2 (near carbon-neutral), while coal releases carbon stored for millions of years, adding new CO_2 to the atmosphere M1 A1.