

Exercise walk-through

6.8

Solar Energy

AP Environmental Science

Solar and wind



Solar PV: clean but intermittent

Photovoltaic cells turn light to
electricity; need storage at night.



Wind: kinetic energy on coasts & ridges

No fuel once built – but both need
backup for calm, dark hours.

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.

Exercises 2.1-2.3

2.1 What does a photovoltaic cell do?

[1]

2.2 What is passive solar design?

[1]

2.3 Why is solar power called intermittent?

[1]

Exercises 2.1-2.3

2.1 What does a photovoltaic cell do? [1]

2.1

- Converts sunlight directly into electricity
-

2.2 What is passive solar design? [1]

2.2

- Building design that captures solar heat without machines
-

2.3 Why is solar power called intermittent? [1]

2.3

- It produces no power at night or when cloudy

Exercise 3.1

3.1 A photovoltaic cell converts sunlight directly into

[1]

☐

A heat only

B electricity

C biomass

D wind

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3.1 A photovoltaic cell converts sunlight directly into

[1]

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A heat only

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3.1 B

- electricity

Exercise 3.2 (a)

3.2 A home installs solar panels.

(a) State one advantage and one disadvantage.

[2]

Exercise 3.2 (a)

3.2 A home installs solar panels.

(a) State one advantage and one disadvantage.

[2]

(a)

- Advantage: renewable, no CO₂, no fuel cost; disadvantage: intermittent or high up-front cost

Exercise 3.2 (b)

3.2 A home installs solar panels.

(b) Explain how the intermittency problem can be addressed.

[2]

Exercise 3.2 (b)

3.2 A home installs solar panels.

(b) Explain how the intermittency problem can be addressed.

[2]

(b)

- Store energy in batteries (or use a backup/grid) for use when the sun is not shining

Exercise 3.3

3.3 Explain the difference between active and passive solar heating.

[2]

Exercise 3.3

3.3 Explain the difference between active and passive solar heating. [2]

3.3

- Active solar uses pumps/fans to move solar-heated water or air; passive solar uses building design (windows, materials) to capture heat with no machines