Power for Tomorrow

Compare energy choices for a town planning its next power source

ENV.2.2 "Investigate and research the pros and cons of using traditional sources of energy (e.g., fossil fuels) and alternative sources of energy (e.g., water, wind, geothermal, biomass/biofuels, solar)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB As you read, underline benefits of energy sources, circle drawbacks, and number two facts about local conditions that could affect the town's choice.

A Town Chooses Its Power

1 A town on a cold lake must replace an aging power plant. Leaders need electricity during winter nights, when heating demand climbs. A coal plant can run whenever fuel arrives, and an existing rail line could deliver it. Yet burning coal releases carbon dioxide, which warms the climate, and pollutants that harm health. Natural gas plants can also be started when needed and usually release less carbon dioxide per unit of electricity than coal plants. Still, gas is a fossil fuel that produces carbon dioxide when burned. Leaks of methane, the main component of natural gas, add a powerful warming gas to the atmosphere.

2 On the ridge above town, strong winds could turn turbines without burning fuel. Wind power produces very little air pollution during operation, but output changes with the wind; turbines may also affect birds and bats if poorly sited. Solar panels on warehouse roofs avoid using new land and generate electricity without direct emissions. Their output drops after sunset and on cloudy days. Batteries could store some wind or solar electricity for later use, but they add expense and have limited capacity. For both options, measurements of local wind and sunlight would help estimate how much power the town could actually get.

3 The lake drains through a river, raising another possibility: a hydroelectric dam can provide adjustable power by controlling water flow. Building one may flood habitat and block migrating fish. Geothermal plants can supply steady electricity using underground heat, but suitable underground conditions are not found everywhere, and drilling is costly. A nearby mill also offers wood waste for biomass power. Using waste can reduce disposal needs, yet burning it releases carbon dioxide and other air pollutants. None of these choices is impact free. Before choosing, leaders should compare local resources, costs, reliability, and environmental effects, rather than treating every renewable source as interchangeable.

2 ANSWER WITH EVIDENCE

Use the passage

1. If leaders need electricity on winter nights and want lower carbon dioxide emissions than coal, why might they consider natural gas? What climate drawback remains?

2. For both ridge wind turbines and warehouse solar panels, give one advantage and one limitation described in the passage.

3. Compare a hydroelectric dam and a geothermal plant. Give one potential benefit and one potential drawback of each.

4. Why might the town consider using the mill's wood waste for power, and why should leaders not call that power pollution-free?

3 YOUR TURN

Your own words

A remote clinic has sunny days, little wind, and confirmed usable underground heat, but it needs electricity after dark. Recommend two sources from the passage, explain one benefit and one limitation of each, and show how your plan meets nighttime demand.

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PART 1 · READ AND MARK

As you read, underline benefits of energy sources, circle drawbacks, and number two facts about local conditions that could affect the town's choice. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	If leaders need electricity on winter nights and want lower carbon dioxide emissions than coal, why might they consider natural gas? What climate drawback remains?	**Gas plants can start when needed and usually release less carbon dioxide per unit of electricity than coal plants. Burning gas still releases carbon dioxide, and methane leaks add warming pollution.**
2	For both ridge wind turbines and warehouse solar panels, give one advantage and one limitation described in the passage.	**Wind produces very little air pollution during operation, but its output changes with the wind. Rooftop solar avoids using new land, but its output drops after sunset and on cloudy days.**
3	Compare a hydroelectric dam and a geothermal plant. Give one potential benefit and one potential drawback of each.	**A dam can provide adjustable power, but it may flood habitat or block migrating fish. Geothermal power is steady, but drilling is costly or suitable underground conditions may be absent.**
4	Why might the town consider using the mill's wood waste for power, and why should leaders not call that power pollution-free?	**Using the wood waste can reduce disposal needs, but burning it releases carbon dioxide and other air pollutants.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would use solar panels during the day and geothermal power throughout the day and night. Solar panels generate electricity without direct emissions, but they cannot produce power after sunset. Geothermal power could keep the clinic running at night because it provides steady electricity. Drilling for it would be costly, so the clinic would need to weigh that expense against its need for reliable power.

Accept other supported advantages and drawbacks from the passage. For the open task, look for a plan that addresses nighttime power and accurately explains a benefit and a limitation of each chosen source.