Power Has a Price

Compare how energy technologies meet needs and change places.

7.C.4.3.C "Examine how the development of technology meets energy demands, as well as modifies the environment (e.g., extraction of raw materials, offshore drilling, nuclear power plants, water diversion, hydroelectric power plants)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline how each proposal supplies electricity, circle a limit on its power supply, and number the environmental changes it could cause. Use your marks to compare the proposals.

Three Ways to Power a Region

1. In a coastal region, homes and factories need electricity day and night. One proposal is a hydroelectric dam on a nearby river. Water held behind the dam flows through turbines, which spin generators. The dam can produce electricity without burning fuel, but its output may drop during a drought. The reservoir would cover some upstream land, including farms and animal habitat. The dam could also block fish moving along the river. Engineers can add fish passages, though these do not remove every effect on the river.

2. Another proposal begins far out at sea. Offshore drilling rigs bring oil or natural gas up from rock below the seabed. Natural gas can fuel a power plant that makes electricity when demand rises. Building rigs and pipelines disturbs parts of the seafloor, and a leak could harm marine life. Burning natural gas also releases carbon dioxide, a gas that warms the planet. Drilling technology supplies fuel that can be moved to where it is needed, but the effects reach beyond the drilling site.

3. A third proposal is a nuclear power plant. In its reactor, energy from splitting uranium atoms heats water. Steam turns turbines connected to generators. The plant can supply steady electricity even when river flow is low, and it does not release carbon dioxide while generating power. Yet uranium must be mined, which changes land near the mine. The plant also needs cooling water and produces radioactive waste that must be stored securely for a long time. Each proposal meets an energy need while changing a different part of the environment.

2 ANSWER WITH EVIDENCE

Use the passage

1. How do the dam and the natural gas plant each make electricity? What makes one more useful when demand rises and the other less useful during a drought?

2. How could offshore drilling for natural gas change the environment both at sea and where the gas is burned?

3. How might a drought affect the dam's power differently from a nuclear plant's power? Name one land change linked to each proposal.

4. Which two proposals can make electricity without burning a fuel that releases carbon dioxide? What environmental cost remains for each?

3 YOUR TURN

Your own words

Write four sentences recommending one proposal for a town that needs more electricity on hot summer afternoons but wants to protect river fish and marine life. Explain how your choice supplies power, name an environmental cost, compare it with one other proposal, and suggest a practical way to reduce one cost.

ANSWER KEY

Power Has a Price

GRADE 7 · 7.C.4.3.C

PART 1 · READ AND MARK

Underline how each proposal supplies electricity, circle a limit on its power supply, and number the environmental changes it could cause. Use your marks to compare the proposals. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How do the dam and the natural gas plant each make electricity? What makes one more useful when demand rises and the other less useful during a drought?	**Flowing water spins the dam's turbines, but drought can reduce its output. A gas plant burns natural gas to generate electricity and can make electricity when demand rises.**
2	How could offshore drilling for natural gas change the environment both at sea and where the gas is burned?	**Rigs and pipelines disturb the seafloor, and leaks could harm marine life. Burning the gas releases carbon dioxide.**
3	How might a drought affect the dam's power differently from a nuclear plant's power? Name one land change linked to each proposal.	**A drought may lower the dam's output, while the nuclear plant can supply steady power when river flow is low. The dam's reservoir covers upstream land, and uranium mining changes land near the mine.**
4	Which two proposals can make electricity without burning a fuel that releases carbon dioxide? What environmental cost remains for each?	**The dam and nuclear plant can generate electricity without burning fuel that releases carbon dioxide. The dam can cover land or block fish, while the nuclear plant requires uranium mining and secure storage of radioactive waste.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I recommend a nuclear plant because it can supply steady electricity, including on hot summer afternoons. Unlike a dam, it would not block fish moving along the river. Mining uranium would change land near the mine, and the plant would produce radioactive waste. The town should require the mining company to restore disturbed land after mining.

Accept any of the three proposals if the response accurately explains its power supply, an environmental cost, a comparison, and a plausible way to reduce a cost. A proposed step can reduce a cost without removing it entirely.