Power Under Pressure

Use emissions data to defend an energy choice

PS.4.h "Generate and defend a data-based claim regarding the use of radioactive materials as an energy source."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two details about when a power source can produce electricity, circle two limits of the emissions data, and number three table values you could use to defend an energy choice.

Choosing Power for a Coastal City

1 A coastal city must replace an aging natural gas power plant. Its council wants electricity with less climate pollution, but hospitals and homes need power at night and during calm weather. The table compares estimated median *life-cycle emissions*, which include fuel production, construction, operation, and cleanup. Values are measured per kilowatt-hour of electricity.

APPROXIMATE MEDIAN LIFE-CYCLE EMISSIONS, IPCC 2014 SYNTHESIS

Electricity source	g CO_2e per kWh
Nuclear	12
Natural gas	490
Wind	11
Solar photovoltaic	48

2 Nuclear plants release energy when uranium atoms split, heating water to make steam that drives a generator. A reactor can produce power regardless of sunshine or wind. Its low emissions do not mean zero risk: used fuel remains radioactive and requires secure storage and oversight. Building a new plant also takes time and money.

3 The table reports typical values, not exact emissions for every project. A town could pair wind or solar with batteries, transmission lines, or other power plants to cover gaps. Since the table measures emissions, it cannot show full costs or the total waste from a facility. To defend a choice, use relevant numbers and address a limitation instead of claiming any source is perfect.

2 ANSWER WITH EVIDENCE

Use the passage

1. A council member favors nuclear over natural gas to lower climate pollution. What numbers support this claim, and what operating advantage does the passage give nuclear power?

2. A neighbor claims wind power must cause more climate pollution than nuclear power. Use the table to test the claim, then name a challenge for wind from the passage.

3. A speaker says nuclear power has no environmental costs because its emissions are low. What table value and passage detail challenge this claim?

4. A resident says the table proves nuclear is the best choice for every town. Why can the table alone not prove this? Name two limits described in the passage.

3 YOUR TURN

Your own words

An inland town is planning its electricity mix. Recommend two sources from the table, with or without nuclear, and defend your choice with two numerical comparisons. Explain how your mix could supply power when wind or sunlight falls, and address one limitation or safety concern from the passage.

Power Under Pressure

PART 1 · READ AND MARK

Underline two details about when a power source can produce electricity, circle two limits of the emissions data, and number three table values you could use to defend an energy choice. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	A council member favors nuclear over natural gas to lower climate pollution. What numbers support this claim, and what operating advantage does the passage give nuclear power?	**Nuclear's median life-cycle emissions are 12 g CO_2e/kWh, compared with 490 for natural gas. Nuclear power does not depend on sunshine or wind.**
2	A neighbor claims wind power must cause more climate pollution than nuclear power. Use the table to test the claim, then name a challenge for wind from the passage.	**The claim is not supported: wind's median is 11 g CO_2e/kWh, compared with nuclear's 12. Wind power may need another source or storage during calm weather.**
3	A speaker says nuclear power has no environmental costs because its emissions are low. What table value and passage detail challenge this claim?	**Nuclear's median life-cycle emissions are 12 g CO_2e/kWh, not zero. Its radioactive used fuel requires secure storage and oversight.**
4	A resident says the table proves nuclear is the best choice for every town. Why can the table alone not prove this? Name two limits described in the passage.	**The table shows typical emissions, not exact values for every project. It also does not show full costs or the total waste from a facility.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I recommend nuclear and wind for the town. Wind's median emissions are 11 g CO_2e/kWh, slightly lower than nuclear's 12, and nuclear's 12 are far lower than natural gas's 490. Nuclear generation can continue when winds weaken, while wind adds electricity with low life-cycle emissions. This plan still needs secure storage for radioactive used fuel, and the table alone cannot tell us whether the town can afford a nuclear plant.

Accept other two-source mixes if the numerical comparisons are accurate and the explanation addresses both power availability and a relevant limitation. Treat the table values as approximate medians, not emissions guaranteed for a particular plant.