Powering Our Town

Weigh energy data and community trade-offs

E.8.10.3 "Using scientific data, debate the societal advantages and disadvantages of technological advancements in renewable energy sources."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two facts that support renewable energy and circle two limits or drawbacks. Number one pair of facts you could use together in a debate about the community center.

A Power Choice for the Community Center

1 At a town meeting, residents choose how to power a community center. One proposal pairs rooftop solar panels with a battery; another uses electricity from a gas plant. Scientists compare life-cycle emissions, including pollution from making equipment, producing fuel, and running the system. The table reports grams of carbon dioxide equivalent, a measure of warming gases, per kilowatt-hour.

APPROXIMATE MEDIAN LIFE-CYCLE EMISSIONS, IPCC (2014); SOLAR EXCLUDES BATTERIES

Electricity source	Emissions (g CO_2e/kWh)
Solar panels	48
Onshore wind turbines	11
Natural gas, combined-cycle plant	490

2 Using rooftop solar could cut climate pollution compared with gas, which may help protect health as warming increases heat risks. Newer batteries store solar electricity for evenings, when the panels stop producing power. However, the solar number in the table does not include an added battery. Making batteries requires mined materials, and replacing worn batteries costs money.

3 Some residents suggest buying electricity from nearby wind turbines instead. Wind has the lowest life-cycle emissions in the table, but turbines generate less electricity when winds are weak. Newer controls can improve how turbines capture changing winds, yet turbines may change views and disturb wildlife. A fair decision weighs emission data alongside reliability, costs, and effects on neighbors.

2 ANSWER WITH EVIDENCE

Use the passage

1. Use two values from the table to argue for rooftop solar instead of gas. What is one limit of this comparison?

2. A resident says a battery solves every problem with solar power. Use passage evidence to challenge this claim.

3. Use the table and passage to give one argument for wind power and one argument against adding wind turbines.

4. Why might a resident still favor the gas proposal over solar? Include the emissions trade-off in your answer.

3 YOUR TURN

Your own words

Write a five-sentence statement to the town council recommending solar with a battery, wind, or gas for the community center. Cite two table values, explain one community benefit and one drawback of your choice, and respond to a likely objection.

ANSWER KEY

Powering Our Town

GRADE 8 · E.8.10.3

PART 1 · READ AND MARK

Underline two facts that support renewable energy and circle two limits or drawbacks. Number one pair of facts you could use together in a debate about the community center. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Use two values from the table to argue for rooftop solar instead of gas. What is one limit of this comparison?	**Solar has about 48 g CO_2e/kWh, compared with 490 for gas, so it could reduce emissions. The solar figure excludes the added battery.**
2	A resident says a battery solves every problem with solar power. Use passage evidence to challenge this claim.	**A battery stores electricity for evenings, but making it requires mined materials and replacing it costs money.**
3	Use the table and passage to give one argument for wind power and one argument against adding wind turbines.	**Wind has the lowest listed emissions at 11 g CO_2e/kWh. Weak winds reduce its electricity output, and turbines may disturb wildlife or change views.**
4	Why might a resident still favor the gas proposal over solar? Include the emissions trade-off in your answer.	**A resident might worry that solar panels stop producing electricity after dark and that batteries cost money to replace. Gas has much higher listed emissions, 490 g CO_2e/kWh versus solar's 48.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I recommend rooftop solar with a battery for the community center. The table lists 48 grams of carbon dioxide equivalent per kilowatt-hour for solar, compared with 490 for gas, so solar could reduce emissions that contribute to warming. The battery stores electricity for evenings, helping people use the center after dark. Critics may point out that batteries require mined materials and cost money to replace, and the solar figure does not include the battery. Even with those limits, I would choose this plan and ask the town to study battery costs before buying.

Accept any recommendation that accurately cites two table values, explains a community benefit and drawback, and answers a plausible objection. Students should not treat the solar figure as including battery emissions.